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FOUNDRY TRADE JOURNAL

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PRINCIPAL CONTENTS

Technical: PAGE

Engineering & Marine Exhibition:
General particulars and details of machinery and equipment on show in the foundry equipment and supplies section . . . 193

The Foundry Industry in Australia, by A. W. Silvester:
In this, the second part of the Paper, the Author deals with moulding sands, refractories and fluxes, and surveys foundry operations in Australia, relating his remarks to the rest of Australian industry and summing up with future prospects . 203

British Steel Castings Research Association Annual Report:
Salient features of operations during the period April 1, 1954 to March 31, 1955 . 211

Features:

Leader: Exhibitions 191
Correspondence 192
Book Review and New Catalogues . . 218
New Patents (Advert section) . . . 33

Commercial:

Fall in UK Share of World Trade . 202
Company News 215
Increases in Capital 215
British Blast Furnacees in the June Quarter, 1955 . . . . . 216, 217
Raw Material Markets 224
Current Prices of Iron, Steel and Non-ferrous Metals (Advert section) . . 32

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Exhibitions

Many readers at the moment have the forthcoming Engineering, Marine & Welding and the Foundry Trades Exhibition well in mind either as standholders or as prospective visitors. This exhibition is entitled to the heading Foundry Trades Exhibition, not only on account of the important section devoted to foundry equipment and supplies, but because of the large number of engineering and foundry concerns which show machines incorporating castings. Whilst this show is held biennially, the foundry-equipment organization participates every four years, deeming that this period allows for really new developments to be shown.

There are two good examples of the benefit of a well-spaced period between exhibitions. One is that, four years ago, the subject of shell moulding was covered by what was virtually an information bureau; now it is a manufacturing process of serious dimensions, as it is in commercial exploitation at between 300 and 400 foundries in this country alone, with hundreds of others still experimenting. The second example is the CO_2 Process, which, though more recent than shell-moulding, has made astounding progress. If new processes are shown too early in their life, natural enthusiasm tends towards overselling. For the general run of foundry plant, the progress is more evolutionary than revolutionary. At each exhibition, it is found that the machines become more automatic and capable of closer control. Such close control usually signifies the elimination of variables and this factor is a prime requisite of the foundry industry.

The stands showing foundry supplies no longer rely on catch-phrases—such as, " best on the market "—or testimonials. The suppliers, too, are interesting themselves in the elimination of variables, and the regular production of a commodity of unchanging quality—which means close control in manufacture—represents better service to the foundryman than the unheralded delivery of something deemed to be " of higher quality " but of perhaps unrepeatable characteristics. At one time, some of the supply concerns were of the back-street type. To-day quite a number possess fine works, housing well-equipped shops and both research and control laboratories. Only recently, we visited a sand quarry, which had the appearance of being—and indeed was—a large-scale chemical processing establishment. As these people show products and not machinery, we suggest that they should feature pictures of the plant and facilities in which they carry out manufacture. From what we have already learned from the standholders, we are convinced that visitors to the Exhibition will learn much of great value to them in the conduct of their duties as foundry executives.

[Stand 15, Row A, Grand Hall, is the JOURNAL headquarters at the Exhibition.]

Correspondence

COAL AND FOUNDRY COSTS

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—Your Leader of August 4 on "Coal and Foundry Costs" deals with a subject that has been well in the minds of furnace engineers for some time, and it has now become crystal clear that industry in this country can no longer take for granted the supply of reasonably cheap, home-produced fuel.

As you point out, steel works are fully alive to the position and it is now the accepted practice for much new and existing plant, even in fully-integrated steelworks, to be oil fired. From a national standpoint, it is indeed remarkable, but rather shameful in its implications, that it has been found to be economical to instal open-hearth furnaces, soaking pits and continuous furnaces—all oil fired—in the principal steelworks, most of which are located in the heart of famous coalfields. This outlook has been influenced not only by actual relative costs but also by the better reliability with fuel oil, both in quality and deliveries. Uniformity of quality of fuel is of particular importance to foundries who have to work to close metallurgical specifications.

You suggest that it should not be beyond the wit of British furnace designers to create a really efficient oil-fired furnace to replace the cupola. You, Sir, are very knowledgeable on oil-fired rotary furnaces and I well remember the keen interest you had in seeing the first of these while it was being put to work to melt iron 20 years ago. This same furnace is still in regular production, having been brought up to date in many respects. I wonder if you are equally *au fait* with later developments from which the claim may be substantiated that the oil-fired furnace has well increased its efficiency both in the all-in cost of the iron produced and its quality. One might ask, therefore, what you mean by "really efficient"?

Whether oil-fired furnaces can ever entirely replace the cupola is another matter. The cupola is so well established in hundreds of foundries that I cannot foresee its replacement by the oil-fired furnace for very many years. Surely the supply of coke at an economic figure is a national necessity? Nevertheless, at this present time there is without doubt an increasingly strong case for the oil-fired furnace for many foundries, and relative overall costs—which comprise many items—do show this.—Yours, etc.,

T. A. BOOTH.

Stein & Atkinson, Limited,
Parnell House. 25, Wilton Road,
London, S.W.1.

August 12.

Purchasing Officers' Association

The National Conference of the Purchasing Officers' Association is to be held at Cliftonville from September 29 to October 1, the headquarters being at the Grand Hotel. As usual a Minibition is being arranged. A day-and-a-half will be devoted to business sessions, whilst a full social programme has been arranged for the evenings. The opening address is to be given by Mr. Harold Watkinson, Parliamentary Secretary to the Ministry of Labour and National Service. Full details of the conference are available from the secretary of the Association, Wardrobe Court, 146a, Queen Victoria Street, London, E.C.4.

Cocktail Party

INDUSTRIAL NEWSPAPERS, LIMITED

Last Friday, in the conference room, a party was held to enable the senior staff of Industrial Newspapers, Limited (including the FOUNDRY TRADE JOURNAL) to take leave of Mr. Harold Jeans, who that day resigned his position as chairman of the board of directors. Mr. Barrington Hooper, C.B.E., is to replace him as chairman, and will continue as managing director. Mr. Jeans has been connected with the FOUNDRY TRADE JOURNAL since 1904, when he bought it from the original proprietors. Though he always took a profound interest in the Institute of British Foundrymen, he only joined in 1935, participating in an international convention held in America. Mr. V. C. Faulkner handed to Mr. Jeans a silver tray on behalf of the staff. Mr. Jeans' friends throughout the world will join his colleagues at John Adam House in wishing Mr. and Mrs. Jeans good health and happiness.

BISRA Conference

A conference on electric overhead travelling cranes, organized by the plant-engineering division of the British Iron and Steel Research Association, will be held at the Hotel Majestic, Harrogate, on October 5 and 6, under the chairmanship of Mr. W. F. Cartwright, D.L., J.P., M.I.MECH.E., assistant managing director and general manager (steel division) of the Steel Company of Wales, Limited.

Although much of the conference will be specifically related to the electric overhead travelling type of crane, other aspects of the subject, such as studies of cab and control design and the techniques of stress measurement, will have a much wider application. An account of the research on cranes carried out by BISRA is contained in "BISRA Summary No. 77," a copy of which is available on application to the information section, British Iron and Steel Research Association, 11 Park Lane, London, W.1. The specification for heavy duty E.O.T. cranes for use in iron and steel works has also been revised in the light of this research. Copies of the revised specification will be available in September, prior to the conference. (Charge to non-members, 10s.)

Full particulars of the conference may be obtained from the technical secretary, plant-engineering division, British Iron and Steel Research Association, 140 Battersea Park Road, London, S.W.11.

Levy Silver Medal

At the first annual meeting of the National Society of Master Patternmakers, it was announced that the president, Mr. B. Levy, had given a sum of money to establish a Trust Fund. From it there will be made an annual award known as the Levy Silver Medal. The award is open to both members and non-members of the Society. Details of the conditions governing the award may be had from the secretaries of the Society—Mann, Judd & Company, 8, Frederick's Place, Old Jewry, London, E.C.2.

Latest Foundry Statistics

According to the British Iron and Steel Federation, there was a slight increase in employment in steelfounding as at June 4. The total was 19,915 as compared with 19,909 in May and 19,807 a year ago. The average weekly output of steel castings during May was 5,100, whilst in April it was 5,600, and 5,400 a year ago.

Engineering & Marine Exhibition

Foundry Section in this Year's Comprehensive Display at Olympia, September 1 to 15

Visit "Stand Fifteen"
(Row A, Ground Floor, Grand Hall)
Readers are invited to call at the JOURNAL stand when visiting the Exhibition.

Under the full title this year of "Engineering, Marine & Welding Exhibition and the Foundry Trades Exhibition," this biennial function opens at Olympia next Thursday and remains open for a further 14 days. Although the exhibition is held every two years, the foundry supply industry shares in it only every second occasion, and thus in this year's display the progress made in the industry in the last four years is concentrated in the foundry section. This will be the natural rendezvous of founders from home and abroad and there is undoubtedly much for their interest.

Honorary president of the exhibition this year is Mr. H. S. "Dick" Broom, M.B.E., B.SC., M.I.MECH.E., president of the British Engineers' Association, joint managing director of Broom & Wade, Limited, founders and compressed-air engineers. The show will occupy all the accommodation at Olympia, covering more than ¼ million sq. ft.; there are over 500 exhibitors covering the whole field of British foundry and engineering practice. It is expected that large numbers from overseas will visit Olympia —the 1953 exhibition received visits from representatives of 60 countries.

Official Delegations

As usual, there are days and times set aside for the reception of delegates from trade associations, institutes and societies. Of the 75 organized parties in this category, those mainly connected with the foundry industry—including, of course, the Institute of British Foundrymen—are to pay their visit on September 5. One exception is the National Society of Master Patternmakers whose delegation is scheduled for September 7. The exhibition is open daily (except Sundays) from 10 a.m. to 8 p.m.

Foundry Section

The stands of the foundry supplies and equipment manufacturers which are individually described in this account are mainly located in the Grand Hall at Olympia, on the ground floor (an exception being the stand of the Morgan Crucible Company, Limited, situate in the Empire Hall).

The FOUNDRY TRADE JOURNAL has its own stand in this section (No. 15, Row A). Here, staff will be available to answer enquiries about the JOURNAL, give service to home and overseas foundrymen and others visiting the exhibition and generally act in a liaison capacity with other exhibitors. It is expected, too, that "Stand Fifteen" will provide a rendezvous where foundrymen may converse on current topics when keeping appointments with their friends.

Although the following information is as full as practicable and as accurate as possible, it is intended as a rough guide only. In addition, there is much improvement and extension of size range of established foundry plant among the stands, which will well repay careful examination:—

Acme Conveyors Limited, 181, Knightsbridge, London, S.W.; **Stand 14, Row A.**

The Acme companies have extended their activities by acquiring the old-established company of Ventilating Equipment (Stockport) Limited. At this exhibition will be shown for the first time an Air Tumbler type 4DW, the item being an actual machine ready for delivery to one of the largest automobile plants in the country. To explain the principles and operation of the Air Tumbler, two working models will also be on show.

The conveyor section of the stand will show the appropriate sludge ejector for the largest Air Tumbler, which has a cleansing capacity of 30,000 cub. ft. of air per min. Also on view will be a series of perspective drawings, showing some well-known foundries that have used the firm's products.

Finally, Coleman-Wallwork Company, Limited, will be showing on the stand a film of an all-British automatic moulding machine. This piece of equipment is shown at work in the Stotfold, Bedfordshire works prior to despatch to Ley's Malleable Castings Company, Limited, which company already operates three of these machines.

August's Limited, Exmoor Street, Halifax; **Stand 16, Row E.**

This well-known equipment firm is showing the new F-type August-Simpson mix-mullers. The 2F model has lightweight, low-inertia mullers with adjustable spring pressure, 800 to 2,000 lb. and a batch capacity of 2,000 lb. Also to be shown is the special No. 00 size, in stainless steel, with heating/cooling chambers and vacuum hood. This is claimed to be ideal for the mixing of sand/resin for shell moulding. In addition to the actual exhibits, the firm will also be publicizing sand-preparing plant for foundries and mechanical-handling plant in general. Two new developments are announced as follow: (1) The National sand recovery system—utilizing a new method of sand reclamation for use in foundries. Reclamation should not be confused with reconditioning—reclaiming by this method affects the physical state of the sand grain rather than the mass, and thus provides new sand for old. (2) The National Hydro-Filter—a high-efficiency dust-collector operating on the wet-collection principle, utilizing an ingenious means of achieving intimate contact between air and wash water. These two units are being manufactured by August's under licence from the USA.

Birlec Limited, Tyburn Road, Erdington, Birmingham; **Stand 17, Row K.**

Birlec equipment on show will cover three main branches of the company's products—heat-treatment equipment, melting furnaces and Lectrodryers for the

Engineering & Marine Exhibition

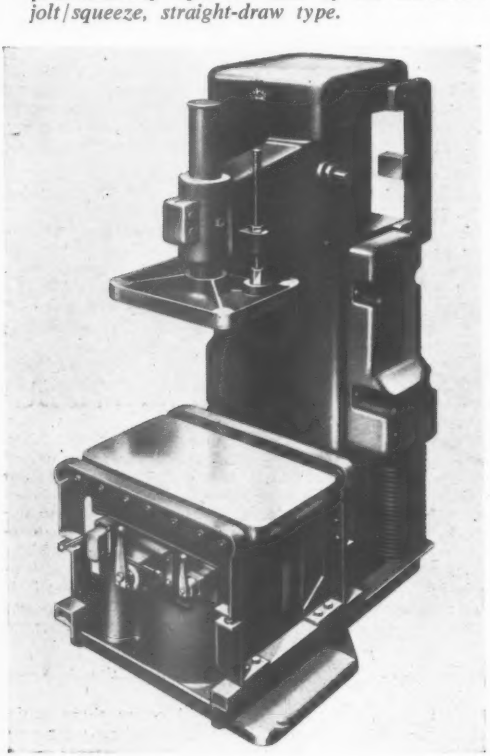
humidity control of compressed air, process gases and certain work and storage rooms. The opportunity will also be taken at the exhibition of introducing the firm's HRP—a new heat-treatment furnace for foundry and similar heavy work. The latter has been designed to provide all the advantages of electric heating, and temperature uniformity to ± 10 deg. C. can be readily obtained over a temperature range of 700 to 1,050 deg. C. The internal design of this furnace has been tested in the field for well over two years in one of the largest steel foundries in the country. To assist the handling of heavy charges, generous space has been left clear, the elements being entirely removed from the side walls and secured by hookpins on the underside of the arched heating-chamber roof. Further elements are located in slots beneath the hearth slabs, to assist temperature uniformity; they are easily removable for inspection or replacement. The standard nickel/chromium ribbon elements are, therefore, protected from the possibility of mechanical damage by castings being pushed into or dragged out of the furnace. An additional heating element is inserted in the door brickwork to counteract inevitable heat losses at this point. This element is separately zoned, and switches off and on as the door opens and closes. The furnace is available in two standard sizes; the smaller, which will be on exhibition, is rated at 50 kw with charge-space dimensions of 4 ft. by 2 ft. 6 in. minimum width by 1 ft. 6 in. minimum height. The larger, of 70 kw. rating, has dimensions of 5 ft. by 3 ft. by 1 ft. 6 in.

Of Birlec electric melting furnaces the largest working unit will be a 35 kw. Tama unit (molten aluminium capacity, 500 lb.)—a low-frequency induction melting furnace for aluminium, zinc and their alloys.

Another small furnace on view will be the IC Detroit unit for investment casting. The larger types of electric melting furnaces will be represented by models and photographs.

To solve problems of gas drying, for example, annealing-furnace atmospheres, Birlec Lectrodryers are designed to maintain dewpoints down to minus 60 deg. C. and control relative humidities at 5 per cent. In addition, working pressures of over 5,000 lb. per sq. in. can be handled, or flows of 100,000 cub. ft. per min. The Lectrodryer is non-chemical in action, drying being obtained by adsorption of moisture on activated alumina from air, gases (or certain liquids) passed through it. When heated, alumina releases this moisture without deterioration and has, therefore, a practically indefinite life. It is usual practice to employ two or more beds of adsorbent so that, whilst one is on drying duty, the others are being reactivated for further use. The Lectrodryer on show at the Exhibition is known as model BY 1.

FIG. 1.—*New. B.Q. moulding machine by British Moulding Machine Company, Limited. It is pneumatically operated and of the shockless jolt/squeeze, straight-draw type.*



British Foundry Units, Retort Works, Chesterfield; **Stand 15, Row E.**

This company is showing a full range of Crulin, Crudol and Crudex coremaking products, including both oils and compounds. These include oil-impregnated cereal binders; cereal binders; bonds for use in the CO_2 Process of core and mould making, and mould dressings for castings in all metals. A variety of cores and castings produced with these materials will be exhibited, along with a range of other products used in moulding operations, including coal-dust, plumbagos, blackings, Beecro silica-free parting-powder and Beecrol parting solution. Foundry requisites on show will consist of goggles, respirators and industrial gloves, while among machinery and plant there will be the Vortec sand mixer, Rotoil sand mixer, Rutland racking hoist, ladles, moulding boxes, etc.

British Industrial Sand Limited, Holmethorpe, Redhill, Surrey. **Stand 13, Row K.**

This firm will be exhibiting its full range of silica sands from quarries at Redhill and King's Lynn, including the special grades which are produced for shell moulding and for the CO_2 Process, in addition to normal foundry sands. As is the usual custom, there will be a display of moulds, cores and castings which have been produced from the sands, and which will be exhibited by courtesy of various customers.

British Moulding Machine Company, Limited, Faversham, Kent; **Stand 14, Row G.**

This firm is showing for the first time, a shockless, jolt/squeeze/strip moulding machine, Fig. 1. It is semi-automatic in operation and fitted with a pneumatically-operated swinging head. The machine also has a lifting frame that will strip the box from the pattern, this frame is fitted with rollers to enable the boxes to be rolled on the machine and the finished moulds to be rolled away. In addition to this new machine, the firm will be showing its latest models of the BT.1 and BT.5 turnover moulding machines that have been shown both at Olympia and in the United States on previous occasions.

Carbon Dioxide Company, Devonshire House, London, W.1; **Stand 15, Row K.**

This firm's equipment has been developed to give a regular supply of carbon-dioxide in the foundry in connection with the new sand core and mould-hardening process, and includes both mobile and static installations. For mobility, a foundry rack mark II, using CO_2 supplied in service cylinders, has been designed, incorporating a thermostatically-controlled electrical superheater reducing unit which ensures a continuous supply of the gas at reduced pressure, to the operators. Also utilizing cylinders is the standard wall unit, which embodies the same principles of operation as the mobile rack.

In addition, the firm is exhibiting "Cardice" converters, also utilized in foundries, and displaying models of the low-pressure, bulk liquid-CO_2 tanks and tankers, which is the latest method of distribution of the gas now available to the foundry industry.

Carborundum Company Limited, Trafford Park, Manchester, 17 **(Stand 15, Row H).**

This company is showing a display of refractory materials in silicon-carbide and fused alumina. These refractory materials are made into bricks and special shapes known under the trade names of Carbofrax, Refrax and Alfrax and are designed to withstand the highest temperatures met with in foundrywork to resist abrasion. It is claimed that they do not spall under rapid changes of temperature. The high thermal-conductivity of silicon-carbide is effectively demonstrated in a number of foundry applications. The display covers bricks, tiles, kiln-furniture, tubes and muffles along with a range of high-temperature cements.

Carborundum crucibles in varying shapes and sizes are shown, for use in the non-ferrous metal melting industry. Ferrocarbo silicon-carbide briquettes for processing iron are exhibited which it is claimed ensure fluidity, machinability and a high yield of finished castings. In addition to these, Globar high-temperature electric heating-elements are also displayed.

Constructional Engineering Company, Limited, Titan Works, Charles Henry Street, Birmingham, 12. **Stand Nos. 12 and 16, Row F.**

Constructional Engineering Company Limited are having two stands, as in previous exhibitions, on which they will display or demonstrate their own products and those of associate companies—Adaptable Moulding Machine Company, Limited, and E. Tallis & Sons Limited. Included in the range of plant on show are to be cupolas, ladles, sand projectors, dryers, mixers, riddles, coreblowing machines, centrifugal casting machines, moulding machines, moulding boxes, and Titanite-stone mixture in the form of patterns and models, etc. The main stand (No. 12) will be mainly concerned with plant; the smaller stand being devoted almost entirely to demonstrations, including for the first time the Titanette Mark I and II bench-type coreblowing machines (the Mark I producing shell cores) and Mark II oil-sand cores and cores by the CO_2 Process. Also in operation are to be Adaptable moulding machines, sand riddles, core sand mixers and the 75-lb. coreblowing machine.

An item of particular interest is a scale model of a Metallurgical Blast cupola. This is an unique design which differs considerably from conventional hot-blast plant. The model, which is approximately 4 ft. long by 2 ft. wide by 3 ft. high is completely detailed; specialized staff will be available to deal with inquiries for this particular equipment. Also to be shown for the first time is a new sand projector and aerator, particular features being ease of maintenance, the whole machine having been designed so that major wearing parts can be changed in a matter of seconds. As well as a portable power riddle, there is to be a new suspended-type gyratory riddle.

F. & M. Supplies, Limited, 4, Broad Street Place, London, E.C.2. **Stand No. 17, Row J.**

For the first time, F. & M. is to show developed plaster stone—Stolit "J"—for the production of patterns and patternplates for use on jolt/squeeze/type moulding machines. The product is supplied in powder form, is easy to mix and handle, and when mixed possesses suitable flowability to give accurate details. Another recent development which will be shown is Supinex R core powder. This is a binder for which is claimed exceptional knock-out properties, with the minimum amount of fumes and gases. Other exhibits will include: core-oils, -creams and -compounds; ferro-alloy briquettes, parting powder and liquid parting (PLP), core adhesives, core gum, Ferin iron cement, feeder-head compound, fluxes, etc., all being manufactured at the London works.

On their stand, **George Fischer Limited,** Schaffhausen, Switzerland (Representatives for UK and Eire: Foundry Suppliers Limited, 25a, Cockspur Street, London, S.W.1) **Stand 15, Row J,** will be shown a comprehensive range of "GF" precision sand-testing equipment including sand-rammer, strength-testing apparatus, permeability meter, intensive mix/muller, sand washer, infra-red rapid dryer, binocular microscope, core-hardness tester, "green" hardness tester, core-baking oven and sintering furnace. In addition, there will be the latest bench-type "GF" impulse coreblower. This last machine can also be seen in operation on the adjoining stand of the Harborough Construction Company Limited.

Fordath Engineering Company, Limited, Hamblet Works, Albion Road, West Bromwich; **Stand 14, Row E.**

Fordath are showing several sizes of their New-type mixing machines; a worm-geared roller mill; the Multi-plunger; multiple rotary core machines, and several coreblowers of different sizes. There will also be a very interesting and comprehensive display of cores submitted by numerous British foundries and made from the firm's core compounds, including cores made from quick-drying corebinders, and the most recent development—Glyso auto-hardening binder. Technical staff will be available to discuss any core-production problems.

Foundry Services, Limited, Long Acre, Nechells, Birmingham, 7; **Stand 16, Row A.**

Apart from illustrating the wide range of Foseco products this firm will also be giving "live" demonstrations of several of their materials in action. A feature will be made of the company's overseas connections as they now have associated companies or agents in no fewer than 38 countries.

Fullers' Earth Union, Limited, Nutfield Road, Redhill, Surrey; **Stand 10, Row D.**

The Fullers' Earth Union, Limited's stand illustrates the use of Fulbond (sand-bonding clay) in foundry sands and other Fullers' Earth products which are valuable to engineering firms and to industries supplying them. Fulbond is shown together with with iron, non-ferrous and light-alloy castings made in synthetic sands bonded with the material and natural sands strengthened with it, some in "green" and some

Engineering & Marine Exhibition

in dry-sand. Sand-testing apparatus on the stand demonstrates the properties of the bonded sands. Cores containing the material to confer green-strength are to be seen.

Other applications demonstrated are where activated Fullers' Earth powder is used for decolorizing and purifying lubricating oils—including waste oils—and technical oils such as linseed oil; raw and treated oils are shown. Fulbent for use in rotary-well-drilling muds, modifying cement and in making emulsions, will be found on the stand. The chemical and physical properties of Fullers' Earth products illustrated and the uses flowing from them, may suggest further possibilities for adaptation in research and development.

General Refractories, Limited, Genefax House, Sheffield; **Stand 13, Row F, Grand Hall.**

The refractories requirements of the user is the main theme of the display of General Refractories, Limited. Products covering the refractories requirements of all types of industrial plant are shown, in conjunction with illuminated cross-sectional drawings of typical furnaces indicating at a glance the recommended refractories to give the most efficient and economical service. A comprehensive range of basic, silica, fireclay, high-alumina and sillimanite bricks, heat- and acid-resisting materials, heat-insulating refractories, fire cements. jointing materials and monolithic compositions to meet every requirement are being shown. Of particular interest to foundrymen is a display of shell-moulding sands with examples of their application. Specially featured is the Densyl silica brick, a new and outstanding development in silica refractories for use in open-hearth steel furnaces, electric furnaces and glass furnaces. The palletization of refractories and the advantages this service offers to users, including freedom from damage in transport and economy in stacking is demonstrated. Members of the firm's technical staff will be in attendance to give full information concerning the application of all types of refractory products.

Harborough Construction Company, Limited, Harbilt Works, Market Harborough, Leicestershire; **Stand 16, Row J.**

Harborough Construction Company will concentrate on the more-recent developments of the firm in the field of foundry supplies, such as those for the CO_2 Process, air-setting and fast-baking core oils, new and improved fluxes for metal treatment (such as the combined degasser/modifier in one unit), and insulating and exothermic aids for the efficient feeding of castings. In addition to a variety of actual examples of production cores and castings, two colour/sound films will be shown—one illustrating the CO_2 Process in use in various types of foundries and indicating the versatility of the process; the second the production of patternplates by the pressure-casting process.

W. J. Hooker Limited, 4, Midland Crescent, Finchley Road, London, N.W.3. **Stand No. 16, Row K.**

A full range of Investril casting equipment for applying the lost-wax process will be shown on this stand. This will include large and small casting machines, moulding presses and wax injectors, together with a full range of accessories and investment materials. Moulds and wax patterns will also be on display. On the rest of the stand there will be a representative collection of the improved Hooker tapered slip-off moulding flasks and binders; a selection of equipment for everyday use in a foundry (core and moulding sands, refractory linings, etc., for ferrous and non-ferrous work); and core trays and moulding boards made of Hookerlite.

The firm's pressure- and gravity-die-casting interests will be centred on a full range of Sterling Die-Slick lubricants and a spot-testing unit for the ready identification of metals in bulk is also to be exhibited. An improved-type grinding-wheel-table will be shown, to accommodate the honeycomb type of wheel. The important feature of this machine is that it avoids the difficulty of motor stoppage when large castings are being faced.

J. W. Jackman & Company, Limited, Vulcan Works, Manchester. **Stand No. 12, Row D.**

The various exhibits of this firm cover a wide range of foundry appliances. For sand-preparing plant the "five units in one" scheme is shown. Here, the sand first passes over a mechanical sieve and thence to a magnetic drum for the separation of pieces of tramp iron; direct delivery is made into a skip hoist leading to a special conical-roll mill. Finally, the prepared sand is discharged at one point over the side of the pan to a disintegrator and thence to barrow or truck. All units are motor driven with push-button control at a convenient point.

Casting Displays

Although not in the foundry show proper at Olympia, many engineering firms are including displays of castings on stands in other parts of the exhibition. One example of these is the David Brown Group (Stand 4, Row P, National Hall, ground floor) where eight companies are represented on a combined exhibit. The display includes gears, turbine-gear units, steel and bronze castings, railcar gearboxes and numerous other examples of the organization's multilateral production. Among the larger items are a cast-steel rolling-mill pinion, a cement-plant spur girth ring, a pair of heavy-duty bevel gears, and a marine-turbine-case casting. Of particular interest are the A-bracket casting in Taurus bronze (shown in the illustration) for use on in-shore minesweepers, a hydraulic-cylinder casting, a slush-pump casting; machined pump-bonnet casting and a superheat bracket in non-creep steel.

In connection with moulding machines, the difficulty of handling large jobs produced by snap-flask moulding has been met by the Osborn Rota-lift (Fig. 2). This is a pneumatically operated machine of rigid and robust design, wholly above floor level, handling a wide range of sizes. The production sequence is: ram—bottom-half jolted, top-half pressed; draw; roll-over; and close. In the latter operation, after drawing the patternplate, the top-half is swung over the bottom-half and the latter raised by the press cylinder into contact with the top half; the pins automatically line up, air clamps are released and the table lowered. The finished mould is then ready for removal from the machine. The flask used is the Fremont taper spread-lock design, made of magnesium alloy.

Other Osborn moulding machines to be exhibited include the jolt/squeeze/stripper, a portable machine suitable for single- or double-sided patternplates; the rollover/jolter, with roller conveyor; and the portable rockover/jolter; this follows the standard design of machine but is of smaller size. For core-making, the layout exhibited includes a standard Osborn coreblower together with a core rollover and draw machine, both being arranged with automatic controls. A small bench coreblower is shown, which will produce cores up to 8 lb. and is specially designed to handle heavily-bonded sands. Other items on show include the Jackman Vibrocon shake-out for loads of ½ to 15 tons; a casting ladle of 5 tons capacity which embodies an entirely new feature of the gearbox completely assembled and mounted on one of the trunnions, and a Brinell hardness tester of the radial-arm type.

Keith Blackman, Limited, Mill Mead Road, London, N.17 **(Stand 1, Row A).**

Keith Blackman are showing for the first time the Keno hydro/rotor industrial wet-washer for removing finely divided dust particles from air streams as, for example, from grinding, polishing and buffing machines, enamel-spraying booths, etc. This new development comprises a water tank, rotating helix and squirrel cage, set of eliminator plates and either an axial or centrifugal fan. The washer may be supplied in various arrangements to suit particular applications, as, for example, with scraper bottom and/or continuous sludge filter. Other applications, in compact form, include use as an industrial air-conditioning washer or humidifier.

Other items from the firm's range will include: (*a*) Series I, moulded fans (direct driven by the firm's own totally enclosed motors) and available in three sizes, Nos. 1, 2 and 3 (6 in., 12 in. and 18 in. dia. impellers, respectively); (*b*) Series II, fabricated fans with indirect pulley drive (both shown for the first time). Each type is made from a rigid P.V.C. material and is resistant to fumes at temperatures up to 120 deg. F. Another exhibit on show for the first time is a 33-in. dia. reversible marine-type pivot roller axial fan. There will also be a 12-in. dia. portable fan with flexible hose for ventilating confined spaces; a No. 15 marine, type centrifugal, multivane fan with its casing and impeller hot galvanized after manufacture and a 9-in. dia. type EF.2 Extravent window fan for exhausting vitiated and recirculating fresh air in offices, photographic dark rooms, etc.

Monometer Manufacturing Company, Limited, 115 116, Strand, London, W.C.2; **Stand 12, Row C.**

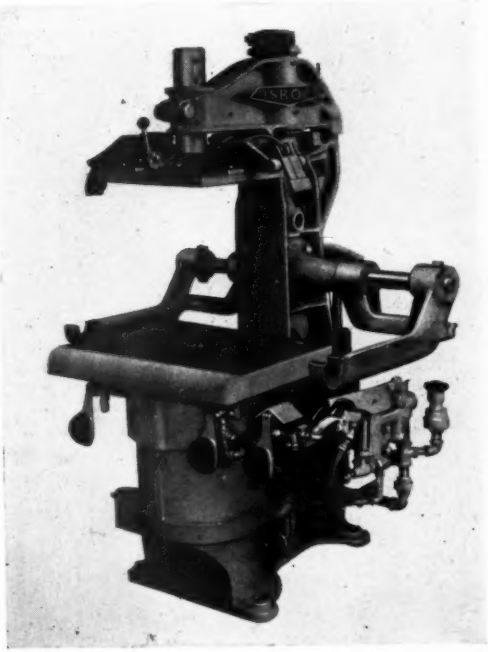
Monometer are showing a 12-ton (iron) capacity, fully-mechanized, oil-fired hot-metal receiver for holding irons at pouring temperatures as tapped from the cupola. It is claimed for this that irons as tapped from a furnace can be kept at pouring temperature for long or short periods, thus ensuring a supply of hot metal at all times. Also on the stand is a 2-ton capacity fully-mechanized oil-fired rotary melting furnace for copper, gunmetal, aluminium and other non-ferrous metals, as well as irons and steels; a ½-ton capacity oil- or gas-fired semi-rotary melting furnace for copper, gunmetal and aluminium, and a double-ram hydraulic lip-axis oil- or gas-fired crucible tilting furnace for non-ferrous metals.

Morgan Crucible Company Limited, Battersea Church Road, London, S.W.11. **Stand No. 4, Row U, Empire Hall.**

Although mainly devoted to a display of crucibles, furnaces and refractories, the stand will display many other products of interest to engineers, technicians and designers. In the foundry section, three furnaces will be shown: the HLP Mark II 600-lb. (brass) oil-fired hydraulic lip-pour furnace; the firm's miniature crucible furnace—a portable unit capable of melting up to 32 lb. of copper in 30 min.; a bale-out furnace of 300-lb. (aluminium) capacity. Salamander-Super and -Suprex crucibles will be shown together with a range of plumbago accessories and foundry tools. Attention will be focused on the new range of supercharge pre-heating crucibles. For these crucibles it is claimed that by using an established melting principle, they will give up to ¼ saving in fuel costs, give longer crucible life and increase output, all from the existing furnace equipment. Another exhibit of particular interest to the ironfounder features plumbago ladle-liners, slag-hole blocks, launders, etc.

The part devoted to Morgan Refractories Limited

FIG. 2.—*"Osborn" Rota-lift moulding machine featured on the Stand of J. W. Jackman & Company, Limited.*



Engineering & Marine Exhibition

will illustrate, *inter alia*, burner quarls made from MR high-temperature castable (service temperature 1,600 deg. C.) and MR plastic mouldable (service temperature 1,650 deg. C.) refractories; low heat-storage insulating refractory bricks; refractory shapes made from Triangle fused-alumina silicon carbide; and mullite and a range of refractory sheaths and tubes.

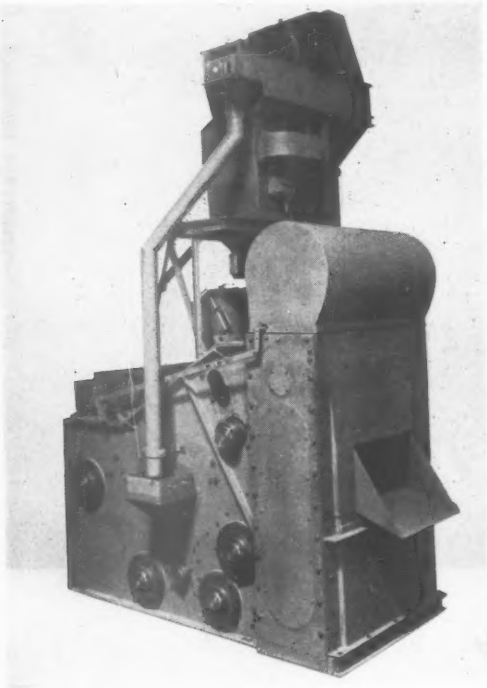
G. Perry & Sons, Limited, Aylestone, Leicester. **Stand 13, Row C.**

This stand incorporates an exhibition of wood and metal pattern-equipment illustrated by actual patterns and photographs, which will include those of pine and mahogany, precision metal-pattern equipment of aluminium, brass and cast iron, particularly as used by the motor industry, including machined patterns, coreboxes, foundry fixtures, etc. Aluminium pressure-cast pattern-plates—both single-sided and double-sided match-plates— will be on show. These plates are made in the firm's own pressure cast foundry. Photographs will be shown illustrating wood and metal patterns being made on a wide variety of machines.

Pneulec, Limited, Mafeking Road, Smethwick; **Stand 11, Row C.**

The Stationmaster automatic jarr/squeeze/strip moulding machine is demonstrated for the first time in this country on the Pneulec stand. This machine has two patternplates indexing between two stations. Jarring and squeezing take place at one station and stripping and empty-box placing at the other. Operation at both stations is simultaneous, with corresponding increase in production. Empty boxes are placed automatically and finished moulds removed in the same way. All operations are mechanical and there is no manual work whatever in the making of the mould. Other items of equipment to be seen on the stand include the latest Pneulec Royer sand mixer of which thousands of the earlier designs are in operation.

FIG. 3.—*"Automat" continuous, barrel-type shot-blasting machine by Spencer & Halstead, Limited.*



Polygram Casting Company, Limited, Power Road, Gunnersbury, London, W.4. **Stand No. 11, Row D.**

Polygram are exhibiting at this exhibition almost the complete range of their shell-moulding equipment and materials including two-station mould makers, both manually operated and semi-automatic, with pattern-plate sizes ranging from 14 by 12 in. up to 24 by 22 in.; a coremaker, complete with a rotating oven, to take four coreboxes—worked in rotation—of sizes up to approximately 12 by 12 by 6 in; vacuum mould-closers to take moulds up to 24 by 22 in., a resin/sand mixer and a sand reclaimer.

It was at the last exhibition in 1951 that this company gave their first public display of moulds, cores and castings made by what was then generally known as the "C" Process. The reaction by the industry was immediate and numerous foundries took advantage of the research development which preceded that showing. In the ensuing years, the simple dump boxes and ovens of the early development work have been replaced by machines to carry out most of the operations required to make moulds and cores. In developing a wide range of equipment, the Polygram concern expresses its confidence in the firm footing that shell moulding has established within the foundry industry.

Ridsdale & Company, Limited, Newham Hall, Middlesbrough **(Stand 14, Row K).**

This firm, pioneers in the manufacture of sand-testing equipment in this country, will be exhibiting a complete range of products for testing the physical properties of foundry sands. In addition to the well-known Ridsdale-Dietert equipment for determining the moisture content, permeability, compression, deformation, tensile, transverse and shear strengths of green-, dry- and core-sands to A.F.S. specifications, and the Ridsdale shatter-index tester, accessories will also be shown for attaching to the Universal sand strength machine for measuring the tensile and transverse strengths of shell-moulding materials.

Other items not previously exhibited include a reel-type oven for baking test specimens of core sand under uniform conditions, and an unbreakable foundry hydrometer for checking the concentration of slurries and washes.

H. G. Sommerfield, Limited, 8, Camden Road, London, N.W.1; **Stand 17, Row A.**

This firm will display a representative selection of shotblasting plants and centrifugal shotting machines. They will also exhibit the liquid blaster and honer and a simple example from the range of air-operated hoists. Abrasives and other items ancillary to the plant will also be included. The Bombardier centrifugal shotting unit will be shown operating the Sommerfield Scarifier —a machine offering continuous and controlled throughput, so that the extent of blasting can be varied according to requirements.

In the compressed-air blasting section is to be shown a heavy-duty cabinet and to emphasize the diversity of the firm's production, a miniature cabinet as used by dental surgeons, jewellers, etc., is included. The ejector blast gun is to be exhibited performing its normal function of light-duty blasting and this same unit, being interchangeable, will also be demonstrated functioning in the liquid blaster and honer.

Spencer & Halstead Limited, Ossett, Yorkshire; **Stand 13, Row G.**

This year the firm's exhibit will be much larger than before; so that a greater range of airless blast cleaning machines will be available for examination. The successful Centriblast barrel machine, is to be exhibited again; this machine has sold in large quantities since it was first exhibited at the Exhibition in 1951, and it is claimed to be a most outstanding machine in its price group for cleaning miscellaneous castings up to 50 lb. individual weight at the rate of between 1 ton and 30 cwts. per hour. This year, the firm is exhibiting for the first time a newly-developed fully automatic continuous-type barrel machine, the Automat, Fig. 3. Its chief feature is that it is suitable for continuous line production or for giving the maximum output of components possible from a single machine. It will accept components for cleaning either as a batch or one at a time, accepting and storing them until a suitable batch has accumulated when they automatically pass forward into the blasting zone of the machine, are treated for a specific pre-set cleaning time, and finally ejected automatically, simultaneously with the acceptance of the next load.

Also to be shown for the first time is the Centriblast 11-ft. dia. plain rotary-table machine which has been introduced since the last Exhibition. Vitreous enamellers report that its 4-ft.-wide loading track and two inclined impellers give very rapid and satisfactory preparation of components for enamelling, whilst the work height of 18 in. above table surface which this machine will accept renders it also suitable for the cleaning of large components up to a maximum individual weight of some 6 cwt. Yet a third new machine is the Centriblast twin-turntable airless cabinet machine—a useful development of the single-table cabinet machine. This eliminates all wasted loading and unloading time due to the fact that one turntable is inside the blast chamber rotating work under the blast of the impeller whilst the other turntable is outside the chamber being unloaded and re-loaded. The turntables provided are each 3 ft. 3 in. dia. and can be loaded to a height of 12 in. above turntable surface, with a maximum load of some 5 cwt. The range of Spenstead dust-collector units will also be exhibited.

John G. Stein & Company, Limited, Bonnybridge, Scotland. **Stand 16, Row H.**

John G. Stein & Company, Limited, are to have on display comprehensive samples of bricks and cements. The firm manufactures a very wide range of qualities, which cover the majority of the requirements of industrial users, including: Firebricks, containing 30 to 42 per cent. alumina; high-alumina bricks, from 50 to over 70 per cent. alumina, either based on hard-fired kyanite or bauxite; silica bricks, containing 96 per cent. silica; basic bricks, both kiln-fired and chemically bonded, including magnesite/chrome, magnesite and chrome; refractory cements, either heat-setting or air-setting, and refractory plastics and concretes, either for making up special shapes, or for ramming or casting *in situ*. Also on the stand will be several scale-models of industrial furnaces, such as ironfoundry cupolas, basic electric steel furnaces, basic open-hearth steel furnace, etc. These are painted in different colours to indicate where the various qualities of refractories are used in the different positions in the furnaces.

Sterling Foundry Specialties, Limited, Bedford and Jarrow; **Stand 14, Row F.**

This exhibit consists of a few representative sizes of the well-known Sterling rolled-steel moulding box as used in many parts of the world. These boxes are made in sizes from 9-in. square up to any size that can be carried by ordinary means of transport, and various methods of construction are used to suit the treatment received in the different types of foundry. So far as the limited space allows, the exhibit shows these various sorts of construction. The new Sterling slip-flask, with jackets to suit, will be on show for the first time (Fig. 4). Two of the firm's high-speed shakeout machines are shown; both new machines. One is a single machine with 10-ton capacity and the other a small machine with a capacity of 250 lb. These models extend the range of machines manufactured by Sterling.

Colin Stewart, Limited, Winsford, Cheshire; **Stand 14, Row J.**

This firm is showing bonding clays produced in England from sterling sources of raw materials, forming a range of bonding clays suitable for all classes of foundrywork. Grades include Quest Standard bentonite, Manxibent and Winbond, all processed at the firm's Winsford factory, also wet- and dry-ground silica for use as an addition to moulding sands to increase dry- and hot-strength and to give increased resistance to scabbing tendencies, and also for use as a fine refractory in mould and core paints. To reduce silicosis hazards, silica flour can be supplied in a wet state (6 per cent. moisture). Other productions are: Chamotte or charp, used as a refractory mould material in investment (lost-wax processes) or as a fine highly-refractory material for mould and core paints; ground quartz (an ingredient in vitreous-enamelling units and as a mill addition to "made up" frits); white bentonite (of an exceptionally low iron-content for use as an opacifier and suspending agent for vitreous-enamelling frits), and parting powder, both waterproofed and silica free. It is also hoped to have on show various small castings

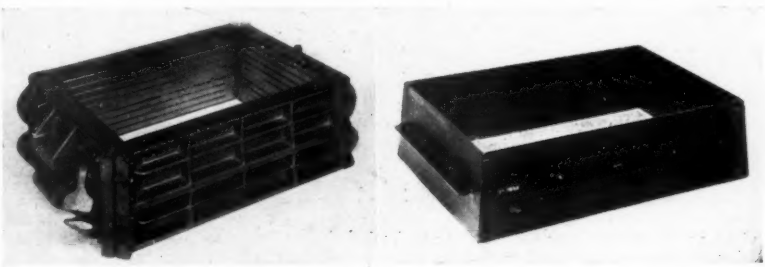


FIG. 4.—*Slip-flask and jacket, a new item of equipment manufactured by Sterling Foundry Specialties, Limited*

Engineering & Marine Exhibition

kindly loaned by customers, and photographs of larger castings in the making of which various of the firm's materials have been used. Another business handled by the firm is custom grinding of customer's material in bulk.

Tilghman's, Limited, Broadheath, Altrincham, Cheshire; **Stand 13, Row E.**

Tilghman's, Limited, include on their stand a newly developed Wheelabrator air-less plant. It is their newly developed automatic casting cleaning unit, to accommodate castings up to approximately 18-in. square. This machine is loaded and unloaded automatically without stopping operation and is equipped with continuous loading conveyor. Castings pass through a 36-in. dia. continuously rotating barrel and are exposed to the blast from two 19½-in. dia. Wheelabrator units. By virtue of the tumbling action within the barrel, all sides of the castings are subject to the abrasive blast and a uniform surface finish, completely free from foreign matter, is obtained. This plant is a high-production unit particularly designed for large quantity output and capable of working continuously for long periods. Other plant being shown in this category includes: Tumblast, models OA and 2C, the former the smallest of the range and the latter of medium size; a 7-ft. 6-in. rotary-table Wheelabrator; a dual-swing-table plant, with 3-ft. dia. tables; and a rotary blast Wheelabrator. Air-operated shot-blast plants which are to be shown include a cabinet model (which will be demonstrated), and a liquid abrasive honing plant, utilizing wet abrasive. For showing dust and fume control, the plants in operation will be exhausted to a small dust-arrester placed on the stand in close proximity to them. In addition, a demonstration panel will be used to show a large automatic dust-extraction unit in operation. A full range of abrasive products and finishes obtained on various metals will be on display as well as a comprehensive selection of spares. In this latter connection, attention should be drawn to the firm's spares and service scheme, which maintains a thorough check on all plants after installation and ensures a 24-hour service for parts. It will be appreciated that it is not practical to instal the larger plants at an exhibition, and to demonstrate these, scale working models will be used.

The firm's air compressor division is also showing, on Stand 12, Row K, Ground Floor, in the same hall.

Thos. W. Ward Limited, Albion Works, Sheffield; **Stand F.15, Row F.**

This firm is showing several examples from the "Polford" range of foundry plant made by Polford Engineering Company Limited, Newcastle-upon-Tyne. A new type gas-fired mould drier has several improved features, including a flame-failure device and special connections for horizontal and vertical operation. It consumes up to 900 cub. ft. of gas at 1½-in. w.g. per hour, and will dry a mould of over 200 cub. ft. in five hours. Another recent development is the portable rotary feeder hopper for delivering sand, coal-dust, etc., at predetermined rates. It is so designed that the material being fed cannot adhere to the sides.

A combined magnetic separator and vibratory screen has screen cloth of 120-tons tensile wire and powerful magnetic pulley of the "permanent" type, which is extremely effective in the reclamation of scrap metal. The core-sand mixer shown will deal with all types of core compound, including semi-solids and all working parts are protected against sand. Drive is by means of totally-enclosed motor through worm-gear and the guard is interlocked electrically so that when it is lifted the motor is switched off.

A central-axis oil-fired melting furnace on view has hand-operated tilting gear; alternatively the furnace can be supplied for coke or gas firing. A special "preheater" top is incorporated and a drop-bottom allows quick release of metal in the event of the pot bursting. The rammed lining of Carbofrax is backed by a superior monolithic insulating material. The list of exhibits is completed by a vibratory shake-out of robust design, a foundry ladle and a display of foundry requisites and protective clothing.

Group Training of Foundry Apprentices

Each year since July, 1952, the two Bonnybridge ironfounders who operate a joint training scheme—Smith & Wellstood, Limited, and Mitchell, Russell & Company, Limited—have started a group of school leavers to train together as apprentices. They do this for several reasons which are in the interests of the boys themselves as well as the companies. Understandably, most boys are nervous when they start work in industry, especially if they are entering a good-sized factory. They hardly know anyone, they probably have only the vaguest idea of the companies' products, they certainly do not know their way about, and no one seems to have much time to spare for the nervous newcomers.

How much better, then, is it to let them meet a number of boys who are "in the same boat" as themselves. Better to tell them what the firm makes and show them the finished article so that they can be proud of their products; better still to take them round the works and show them where this or that department is, and what goes on in them. Best of all is it to start them off in the way they should continue, by explaining why they should take a pride in good craftsmanship, why they should learn to develop a sense of responsibility by working as hard when not supervised as when they are; why it pays to be helpful and friendly to everyone and become a good timekeeper. All this and more, the recent five-day introductory course run by the apprentice supervisor, Mr. R. F. T. Paterson, set out to attain. The 33 different speakers and guides were led by the managing directors of the two companies, and included three outside speakers, viz., Mr. N. Curry, Principal, Burnbank Foundry Trades Centre; the Rev. J. S. Malcolmson, works chaplain, and Sgt. J. Fotheringham, O.I.C. Bonnybridge Police Station. Also there was Mr. T. R. Goodwin, works director, of Smith & Wellstood (Pty.), Limited, South Africa, who came whilst on leave to talk to the boys about export markets.

All the speakers took the same care to set a good example by being punctual and smartly turned out themselves, and by delivering well-prepared talks and showing a desire to be as helpful to these new boys as they hope the boys themselves will turn out to be.

At the end of the week's course a written examination is held, and this year the results were well up to standard. The boys were also asked to say which three sessions they liked or disliked most. Their answers showed a quite remarkable difference in taste, though the "part played by the foundry" and "how solid-fuel stoves and cookers work" had most supporters. The use of films to illustrate talks whenever possible was another factor in helping the boys to understand things which they would otherwise have found difficult to grasp, and in all 16 films were shown, including those dealing with "first-aid and hygiene," "moulding and casting."

* Impregnation of Castings

Porosity in castings is a great problem to the foundryman, especially with modern light metals used by airframe and aircraft engine manufacturers. It results from the cooling of the liquid metal to the solid. Porosity can be reduced by: good design of casting; degasification of liquid metal; pouring at minimum temperatures; proper location of gates and risers; and careful foundry technique.

Internal corrosion and failures of metal finishes may be overcome by impregnating the micropores of the casting with certain liquids. Impregnating is done by (*a*) internal pressure (forcing impregnant from inside casting, outwards), for preventing leakage only; (*b*) external pressure (impregnant sucked from outside by vacuum pump), for sealing "through" porosity; and (*c*) vacuum pressure (casting placed in pressure vessel, vacuumed, and impregnant forced into pressure vessel to fill evacuated pores).

Table I shows various impregnants, and their characteristics.

* Digested from P. M. Young, "Correct impregnation of Castings," *Journal* of the Institution of Engineering Inspection, winter edition, 1954-55.

TABLE I.—*Comparative Properties of Impregnating Materials.*

Material.	Per cent. solids (range)	Method of application.	Impregnating ability.		Exudation characteristics.	Stability in metal.	Cleanliness after impregnation.	Resistance to metal finishing solutions.	Resistance to boiling water and steam.	Chemical resistance.
			Micro-porosity.	Macro-porosity.						
Sal ammoniac in water	—	Internal pressure*	Fair	Poor	None	Poor	Rusty castings	Fair	Poor	Poor
Sodium silicate	32 to 45	Internal pressure	Good	Poor	Exudes above 250 deg. F.	Etches Al or Mg if used on both	Fair	Poor	Poor	Poor
Sodium silicate with solids	35 to 50	Internal pressure	Fair	Good	Exudes above 250 deg. F.	Etches Al or Mg if used on both	Good	Poor	Poor	Poor
Phenolics ..	50 to 75	Batch	Fair	Fair	Exudes badly	Good	Poor	Good	Good	Good
Tung oils ..	40 to 70	Batch	Good	Poor	Exudes	Good	Poor	Good	Good	Fair
Styrene with linseed or dehydrating oils ..	50 to 70	Batch	Good	Poor	Exudes	Copper inhibits cure	Poor	Fair	Fair	Fair
Modified flexible polyester	90	Batch	Good	Poor	Exudes	Copper inhibits cure	Poor	Good	Fair	Fair
Styrene polyesters	94 to 97	Batch	Good	Good	Very little	Copper inhibits cure	Good	Good	Good	Good
Styrene polyester copper stabilized	94 to 97	Batch	Good	Good	None at all	Good	Good	Good	Good	Good

* Cast iron only.

ALFRED HERBERT, LIMITED—Mr. Kenneth W. Norman has been appointed a director.

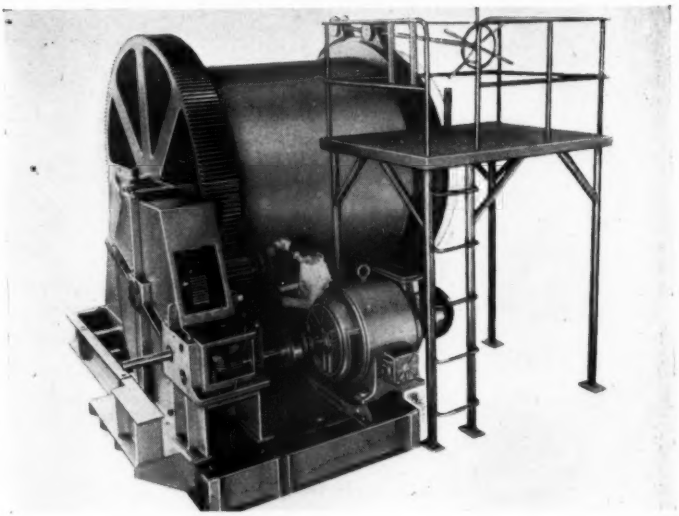
LE GRAND SUTCLIFF & GELL, LIMITED—Mr. C. J. Askwith has retired from the board.

YORKSHIRE COPPER WORKS, LIMITED—Mr. Clifford Breckon, chief metallurgist, has been elected a director in succession to Mr. John Wilkinson, who has retired from the board because of ill-health.

Australian-built Haulage Winch

The Australian firm of Hoskins Engineering & Foundry Pty., Limited, recently supplied the Victorian State Electricity Commission with a 150-h.p., heavy-duty, two-speed haulage winch—shown in the illustration—for the positioning of heavy pipework on the Kiewa project. This vast project is a series of large power-stations being constructed in North East Victoria on the Kiewa River—a tributary of the Murray.

The winch has a drum with a capacity of 5,500 ft. of 4¾-in. circumference rope, and is capable of hauling 15 tons at 120 ft. per min. or 4 tons at 450 ft. per min. A drum-type indicator for the accurate positioning of loads is incorporated and is electrically interlocked in such a way that the operation of the winch is completely safe. The 150-h.p. pipe-ventilated slip-ring electric motor which drives this machine was made by Brook Motors, Limited, of Huddersfield, and was supplied through their agents for Western Australia, Carlyle & Co. Ltd., Perth.



Coke Production in the United States

Production of coke in the United States in 1954, as reported to the Bureau of Mines, dropped 24 per cent. from the 1953 level. Total production was 59,662,496 net tons (of 2,000lb.), of which 59,061,442 tons was oven coke and 601,054 tons beehive coke. In 1953, total production amounted to 78,836,857 tons.

The decline in coke production, which started in the later months of 1953, continued during the first half of 1954, and reached a low point in August. In September, oven-coke output, following the upturn in pig-iron and steel production, started to climb and increased in each succeeding month of 1954. Oven-coke plants owned and operated by iron and steel companies, classified by the Bureau of Mines as furnace plants, maintained a higher operating rate for the year than did other oven-coke (merchant) plants. Rate of production for the furnace plants averaged 77 per cent. of capacity, whereas the merchant plants operated at 61 per cent. The average for all oven-coke plants was 75 per cent., or 18 points below the 1953 figure.

Beehive-coke oven operations did not follow the upturn in industrial activity in the later months of 1954 and consequently output of beehive coke, at 601,054 tons, was the lowest on record (it was 5,243,329 tons in 1953). Practically all of the beehive-coke plants in the famous Connellsville District of Pennsylvania were idle during the entire year. The principal factors for the closing of beehive ovens were the substantial decrease in requirements of blast-furnace coke and the expansion of carbonizing capacity of slot-type coke ovens by the iron and steel companies. Reduced requirements of blast-furnace coke were the result of (1) the low operating rates of blast furnaces and (2) a marked improvement in fuel efficiency of the furnaces. In 1954, blast furnaces producing pig-iron used 67 lb. less coke per ton of pig-iron produced than in 1953. This amounted to more than 1,900,000 tons of coke when based on the 1954 pig-iron production.

The annual coke capacity of slot-type coke ovens increased by 337,600 tons during 1954 and totalled 78,595,600 tons at the end of the year. The 1954 gain in capacity was not as large as anticipated because the decline in demand for coke caused the permanent retirement of six batteries of coke ovens at merchant plants earlier than had been planned by the owners and led to a slackening in construction of new ovens by iron and steel companies. Annual coke capacity of slot-type ovens in the iron and steel industry increased by 1,700,000 tons, but this gain was nearly offset by the decline of 1,400,000 tons at merchant plants.

British Association on the Radio

Bristol, which this year is celebrating the 800th anniversary of the granting of its charter by Henry II, is the venue for the 117th annual meeting of the British Association for the Advancement of Science, from August 31 to September 7. A recorded short version of the presidential address on August 31 by Sir Robert Robinson, FRS, on "Science and the Scientist," will be broadcast the same evening in the Home Service.

On the last day of the meeting, during the course of which some 400 speakers will read papers in 16 different sections, a round-up of impressions by several members present, entitled "Scientists in Session," will be broadcast in the Home Service. Various aspects of the meeting will be covered in a number of BBC television programmes.

July's Steel Output Record

Steel production during the month of July was, of course, affected by holidays; nevertheless, at an annual rate of 16,002,000 tons, it was the best ever recorded in July. Last month's outpute rate compares with 18,939,000 in the previous month, when production was curtailed by the rail strike, and 13,682,000 tons in July, 1954, when strikes at the Margam plant and technical difficulties at Consett affected output.

So far this year, steel output is higher by 6.9 per cent. on the corresponding period of 1954, production in the first 30 weeks of this year, at 11,300,000 tons, comparing with 10,570,000 tons a year ago. This week sees the end of the holiday period at most steelworks. The opportunity has been taken during the holidays to overhaul plant where necessary and to prepare it for a resumption of full-scale operations.

Pig-iron production in July averaged 230,800 tons a week and was at an annual rate of 12,000,000 tons, which compares with the June figure of 11,274,000 tons and with the July, 1954, figure of 10,984,000 tons.

Latest steel and pig-iron output figures compare as follow with earlier returns:—

Period.	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
	Tons.	Tons.	Tons.	Tons.
1955—May ..	241,800	12,574,000	401,600	20,884,000
June ..	216,800	11,274,000	364,200	18,939,000
Half-year ..	235,400	12,242,000	387,500	20,149,000
July	230,800	12,000,000	307,700	16,002,000
1954—May ..	231,400	12,033,000	374,500	19,476,000
June ..	233,200	12,129,000	371,700	19,328,000
Half-year ..	230,100	11,964,000	366,300	19,048,000
July	211,200	10,984,000	263,100	13,682,000

Fall in UK Share of World Trade

As regards the falf in Britain's share of world trade, the Treasury *bulletin* points out that in the nine months ended March, 1955, world trade in manufactures was 12 per cent. higher by value than a year earlier, and for the first quarter alone 18 per cent. higher. But the UK share in this expanding trade had fallen from 21 per cent. in the first nine months of 1954 to 20 per cent. in the six months ended March, 1955. The 1950 percentage was 26 and the 1938 percentage 22. One per cent. of world trade in manufactures equals roughly £100,000,000 of exports.

On the other hand, Germany's share of world trade in manufactures has risen from 7.3 per cent. in 1950 to 15.3 per cent. in the six months ended March, 1955. It is the change in the pattern of world trade which is partly responsible for the rising German and the falling UK share, says the *bulletin*. Intra-European trade has been rising fast, and Germany has a large share of this. Trade between manufacturing countries and primary production in which the UK has a large share, has not been rising so fast.

The Krupp company of Essen has signed a contract worth more than £6,500,000 for the exploitation of the Ptolemais brown coal deposits in Greece, and the building there of a briquette factory, a coke installation, and an electrical power plant. The project will provide the basis for considerable expansion of Greek electrical power supplies to aid industrialization schemes.

The Foundry Industry in Australia*

By A. W. Silvester

(*Continued from page* 176)

Moulding Sands

Australia possesses some of the best deposits of both natural and free sands found in the world. However, their distribution favours certain restricted areas. Since the average foundry selects its sands on both an economic and geographic basis, the distance of the deposit from the foundry and cost of transportation may preclude the use of the correct sand. Victoria is an exception, since this State has a wide selection of natural sands which are available within a small radius of the foundry centres.

Generally, the moulding-sand industry has developed and is operated in a haphazard manner. There is no realization of the importance of selected or graded sands being made available at a suitable price. Both the sand supplier and the foundry owner are at fault; the former is unwilling to risk investing money in grading plant, and the latter is not willing to pay a little more for better quality sand. It is necessary for a foundry to make its own survey for the selection of a suitable sand. However, considerable guidance and assistance can be obtained from the Foundry Sands Investigations, a jointly-controlled Government body, with its headquarters in Melbourne.

The details of the sands available in the various States are as follows, and Table XIII shows the analysis of typical examples.

*Official Exchange Paper from the Australian (Victoria) branch to the fifty-second annual meeting of the Institute of British Foundrymen last June. The Author is materials engineer with Repco, Limited, Melbourne.

Queensland

Along the coastline close to Brisbane and further northwards, dune sands of medium grade provide a uniform material for both cores and synthetic sands. Near Rockhampton, Bundaberg and Mackay, fine free sands are available which are suitable for light castings requiring a fine finish.

Near Brisbane and Ipswich (25 miles away), a number of medium to medium-fine loams have been used with reasonable success, but, due to poor grading, better results are obtained with synthetic sands.

New South Wales[14]

Good deposits of free sands, uniform fineness A.F.S. 50, are provided by a series of dunes stretching along the coast from north of Newcastle to Port Kembla.[14] A finer facing-sand is needed, and the nearest approach to this is from the sands of Anna Bay and Gerringong which are uniform and have a fineness of A.F.S. 60 to 65. Zircon sand from the northern parts of New South Wales and South Queensland has a fineness of approximately A.F.S. 100 and is exported in quantity for foundry use overseas as well as being used locally.

In Sydney, the moulding sands are obtained from Triassic sandstone (Hawkesbury sandstone) and a series of clays and shales which overlie it. The weathering of these beds results in medium-grade moulding sands and fine loams. The Hawkesbury sandstone, when crushed and bonded with bentonite, provides a good steel sand, which

TABLE XIII.—*Grading Analysis of Typical Australian Sands.*

Property.	Sand.							
	Southport, Q'land.	Zircon, N.S.W.	Hawkesbury, N.S.W.	Dune Sand, S.A.	Oakleigh, Vic.	Dandenong, Vic.	Burrumbeet, Vic.	Lake Gnangara, W.A.
Per cent remaining on A.S.T.M. Sieve No.:								
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
20	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	3.8	0.2	0.0	0.0	0.0	0.0
40	0.4	0.2	17.5	1.4	0.6	0.2	0.2	0.2
50	13.2	1.6	28.6	6.8	9.4	0.8	0.2	12.8
70	60.0	34.6	19.9	30.2	45.8	3.0	3.8	78.2
100	24.4	56.6	10.1	42.2	24.4	12.6	8.6	8.4
140	1.8	6.6	3.4	15.4	0.6	24.4	40.4	0.0
200	0.2	0.2	2.0	1.8	0.2	34.4	42.8	0.0
270	0.0	0.0	0.8	0.2	0.2	3.6	2.4	0.0
Pan	0.0	0.0	2.0	0.0	0.2	4.0	0.2	0.0
Total sand grains, per cent. ..	100.0	99.8	89.3	98.4	81.4	83.2	99.6	99.6
Clay substance, per cent. ..	0.1	0.3	10.7	1.6	18.5	16.6	0.5	0.2
Total, per cent.	100.1	100.1	100.0	100.0	99.9	99.8	100.1	99.8
A.F.S. grain fineness No. ..	55	65	54	67	56	123	115	50
A.F.S. grain shape	Sub. ang.	Ang.	Ang.	Ang.	Sub. ang.	Sub. ang. tending to ang.	Sub. ang. tending to ang.	Ang.
Amount retained on three sieves	99 per cent. on 50, 70, 100	98 per cent. on 70, 100, 140	74 per cent. on 40, 50, 70	89 per cent. on 65, 100, 150	97 per cent. on 50, 70, 100	85 per cent. on 70, 100 140	92 per cent. on 100, 140, 200	99.8 per cent. on 50 70, 100

is similar to the Scottish "rotten rock." The medium grade loam has a fineness of A.F.S. 50 to 70, but is only moderately uniform. It has high strength and reasonable permeability. The other sands available in the Sydney district are of indifferent quality. Generally, the permeability is low and the strength variable.[14]

South Australia[15]

Dune sands to the west of Adelaide provide free sands which are uniform, but a grade finer (A.F.S. 70) than similar sands in the other States. The sand from Noarlunga, with a fineness of A.F.S. 110 to 115, has been used successfully for critical work. Loams associated with the Torrens River are used for general iron and non-ferrous work, but are not very satisfactory owing to the poor grading, and more recent trends have, therefore, been towards synthetic sands based on the dune sands.

Victoria[16]

The sand deposits occur mainly within a radius of 25 miles of Melbourne and originate from fluviatile, marine or lacustrine sediments of tertiary age. Coarse sands for heavy iron and steel castings are obtained from Preston and St. Helena These sands are not uniform, but have a fineness of A.F.S. 25 to 30, and exhibit high permeability and strength. A medium fineness sand (A.F.S. 50) is obtained from Oakleigh. This is most uniform and strong, and is very suitable for iron and light steel castings. For stove plate and non-ferrous castings, Dandenong sand is used. This sand has a fineness of A.F.S. 115 to 120, but is apt to have a variable strength and fineness. The free sands are located in the Frankston area and have a fineness of A.F.S. 50 to 60, but are poorly graded.

At Lake Burrumbeet near Ballarat, a deposit of free sand contains two grades, A.F.S. 90 grade with reasonable distribution and A.F.S. 100 to 120 grade which is very uniform. Though costly, this is brought to Melbourne for special work.

Tasmania

The foundry industry in this State is very small, and perhaps for this reason, the supply of natural-bonded moulding-sands is poor. However, uniform fine sands, fineness A.F.S. 50, occur close to Hobart and Launceston, the main foundry centres. Deposits of free sands, fineness A.F.S. 100, occur in a number of places along the north coast.

Western Australia[17]

Moulding-sand deposits occur within a 25 mile radius of Perth, the main foundry centre. Free sands are provided by dune sands which are generally uniform and vary from A.F.S. 30 to 40 fineness. A particularly uniform sand of fineness A.F.S. 50 is available from Lake Gnargara.

Light and medium castings are made in a loam from the river terraces at Guildford. However, this is rather poorly graded. Thus, there is a need for a uniform medium-grade sand; this is being partly supplied from two deposits at Byford and Cardup, of approximately A.F.S. 50 fineness and is moderately uniform.

Clays for Synthetic Sands

Plentiful supplies of fire clay are available close to the main foundry centres, but synthetic sands are mainly based on bentonite as a binder. There are a number of deposits of excellent quality, the three main ones occurring at Trida, New South Wales, Yarraman in Queensland, and at Marchagee in Western Australia. The Trida clay is of average quality only, providing a strength approximately half that of Wyoming bentonite, but the latter two clays give strengths equal to the imported bentonite, and the deposit at Marchagee has been found to closely correspond with the southern type of American bentonite.

Price

The price of moulding sand varies, depending on local conditions. However, in Melbourne, good sand may be obtained at 30s. to 40s. per cub. yard.

Refractories and Fluxes

Whilst there are refractory companies in most States, the main ones are in New South Wales and Victoria. A wide variety of acid and basic refractories are produced, though the production of some, such as pure alumina refractories, is limited, and the demand has so far exceeded the supply of others, such as silicon-carbide bricks and tiles, that delivery times are protracted. Low-temperature insulating materials, such as diatomaceous earth, slag wool, exploded mica and vermiculite are readily available. Apart from bricks, castable refractories and dry-ramming materials are produced, and two companies are making graphite crucibles. The production capacity of the refractory industry has been below market demand.

Silica raw materials are in plentiful supply as are fire clays (15 to 25 per cent. alumina). Kaolin deposits are rarer, and kyanite or sillimanite occur very rarely in small seams, and hence have to be imported. Workable deposits of magnesite are limited.

Supplies of limestone and dolomitic stone for fluxing materials are closely situated to all the major industrial centres. No difficulty has been encountered in obtaining these materials, although they are not available in a variety of graded sizes.

THE FOUNDRY INDUSTRY

The major proportion of the foundry industry is located in New South Wales and Victoria in association with the large engineering centres. The other States have established large foundries to cater for the specific requirements of the railways, mining, hardware and agricultural industries. All the States have foundries attached to their railway workshops, and it has been at these centres that many of the skilled foundry-operatives have been trained in the full scope of their trade. Since the general trend of the larger commercial repetition-foundry is to specialize, it does not offer such good

training grounds for apprentices. In Queensland, in addition to its normal function, the foundry industry caters for the maintenance and repair of the sugar mills, and a large variety of jobbing castings are produced for this special industry.

In Victoria and New South Wales, there is a steady increase in captive foundries attached to specific engineering industries, the greatest example being in the automotive-manufacturing field. It is in these foundries that the greatest advances have been made towards mechanization, product and process control, and technical supervision, and this has been due to the backing of the engineering industry in its demand for castings of uniform quality.

There is to-day a shortage of skilled moulders in the industry, and this is being offset by the employment of plate moulders and by increased technical supervision. However, it is not the answer to this ever-increasing problem which must be found in encouraging lads to the industry and training them under conditions that are competitive with the other trades. Problems of this type are now beyond private enterprise, and must be tackled on a State or Commonwealth Government basis, with private enterprise supplying its just proportion.

Types of Foundries

In Australia, all variations of castings and alloys have been produced, mainly due to wartime necessity. However, under peacetime conditions, a certain proportion of castings are imported, either in the rough or finish-machined condition. These are mainly specialized heavy castings, complex pressure die-castings, and complex alloys, uneconomical to produce in Australia.

The heaviest iron castings are produced at the Direct Metal Foundry at the Broken Hill Proprietary Company. Here the molten metal is taken direct from the blast furnace and castings of up to 80 tons can be poured with this technique. This foundry is also equipped with cupola furnaces for normal melting practice and it principally caters for the requirements of the steel works.[19] (See Fig. 7). Steel foundries in New South Wales have cast up to 60-ton castings, and in Victoria and New South Wales, steel foundries are regularly pouring up to 25-ton castings. A typical example of a first-class steel foundry is that operated by Vickers

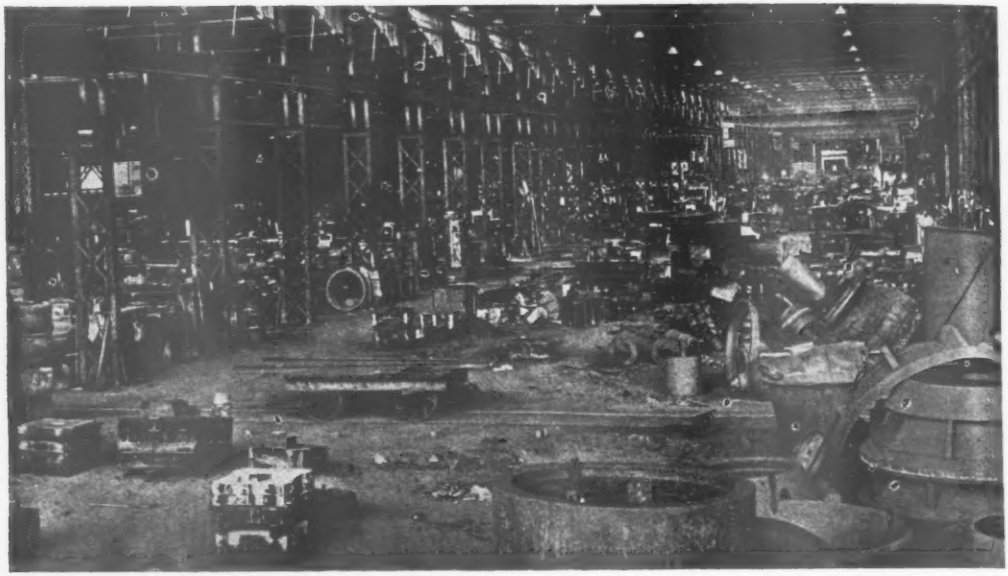
TABLE XIV.—*Types of Ferrous Foundries in Australia*—1951.

State.	Steel.	Iron and steel.	Repetition iron.	Jobbing iron.	Jobbing and repetition iron.	Total.
New South Wales	5	7	32	49	51	144
Victoria	6	4	35	49	46	140
Queensland ..	1	2	10	20	21	54
South Australia ..	3	2	9	17	25	56
Western Australia	1	4	7	15	12	39
Tasmania ..	—	—	3	5	5	13
TOTAL ..	16	19	96*	155*	160	446
Percentage of total	3.8	4.5	23.0	33.8	34.9	100

* There are ten malleable foundries operating in Australia.

FIG. 7.—*Broken Hill Proprietary's Newcastle Steel Works on the Hunter River, N.S.W., with portion of the City of Newcastle in the background. The blast furnaces are located along the river, while the coking plant can be seen in the foreground.*

(Photo by courtesy B.H.P.)



(*Photo by courtesy Vickers Ruwolt Pty. Ltd.*)

FIG. 8.—*View of the steel bay at Vickers Ruwolt, Melbourne. The foundry is* 800-*ft. long and is equipped with three direct-arc electric furnaces and two Tropenas convertors; all grades of steel are produced and castings range up to* 20 *tons weight. The maximum capacity of this foundry is* 7,000 *tons per annum.*

Ruwolt in Victoria, where heavy mining-machinery castings are produced. (See Figs 8 and 9.)

The classification of foundries detailed in Table XIV handling iron and steel, shows that the greatest number operate in New South Wales and Victoria, and cast both jobbing and repetition work.[3]

Comparison of the total number of foundries handling iron and steel in Australia with the number in the United Kingdom, shows that there is a total of 465 in this country and 2,112 in the United Kingdom.

Non-ferrous foundries have not been classified. It has been estimated that there are 720 operating in this country, but it is probable that many more are operating as very small concerns. The production of heavy non-ferrous castings in copper and copper alloys is undertaken by a very limited number of commercial foundries and the railway foundries. For example, the Victorian Railways foundry casts approximately 600 tons of copper alloys annually, and is equipped with a 3,000-lb. rotary oil-fired furnace. In the aircraft and automotive industries, a number of small foundries are producing aluminium-alloy castings to rigid specification requirements.

Production and Capacity

Iron and Steel

The production of iron castings has fluctuated since world war II. A peak level was reached in 1950, followed by a drop of production until the latter half of 1954, where it seems that the level will reach the 1950 peak. During 1950, the combined production of the grey iron, alloy iron and malleable iron foundries was 300,900 tons. The capacity of these plants was rated at 421,800 tons in 1951, so that, with additional plant during recent years, it should have increased to the order of 500,000 tons.

The production of steel castings in 1950 was 32,100 tons, while the estimated plant-capacity was 50,200 tons. There is still a tendency for back orders to increase, despite improved plant-capacity. The main reason quoted for this is the shortage of skilled moulders and transportation difficulties.

The increase of production and plant capacity in both the iron and steel foundries has been largely due to improved methods, since there is a general realization that this is the only way to achieve immediate results. Expenditure on new plant and equipment during the six months ending October, 1954, was £1 million for the iron foundries and £200,000 in the steel foundries.

Non-ferrous

The current production of brass and bronze castings is rated at 4,500 tons per quarter, and it is estimated that this is approximately 60 per cent. of the plant capacity. There has been a general increase in output, but like the ferrous-foundry industry, the prime difficulty is a shortage of skilled labour. The output of zinc and aluminium

castings is rated at 1,800 tons per quarter, an estimated 80 per cent. of plant capacity. The higher efficiency of this latter section of the industry is most likely due to the extensive use of die casting which largely obviates skilled labour. This is particularly evident in a large automotive-parts manufacturer operating both grey iron, sand casting and aluminium die-casting foundries, where it has been comparatively easy to increase production in the latter by improved methods and the introduction of more shifts, whereas in the former foundry, a shortage of skilled labour has been the greatest deterrent

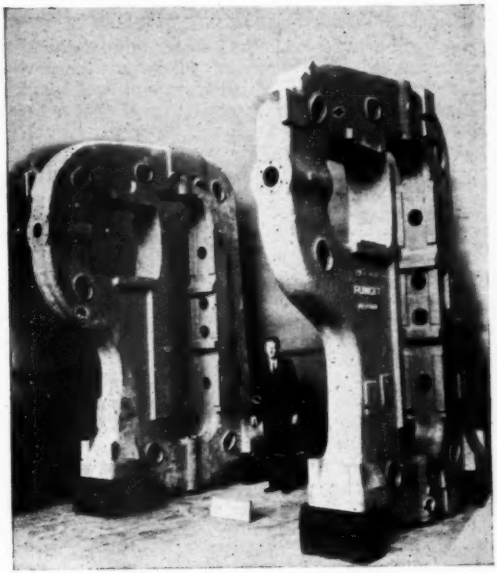
Labour

In 1952, the total labour employed in the ferrous foundries was approximately 15,220 and recent checks have indicated that the level of employment is at present similar. The non-ferrous foundries, including die-casting foundries, employ approximately 6,000. Although the labour market has eased, and despite the continued influx of migrants, the foundries are finding it difficult to meet the shortage of skilled tradesmen which is estimated at 1,500 moulders and foundry labourers.

The most serious aspect of the labour shortage is the lack of juvenile labour; in 1952, fewer than 6 per cent. of the total foundry labour-force were juveniles. Considerable thought and discussion has been given by the various sections of the industry in finding ways of encouraging lads to take up foundry work as a trade, and in some States, the standard of education has been lowered for entrance into apprenticeship. It is doubtful whether such moves will succeed.

At present, the only skilled trade in the foundry is that of a moulder. The apprentice is required to attend a technical college and to qualify as a jobbing moulder and coremaker. The other foundry occupations are classed as unskilled and the youth has to rely upon instruction from a foreman or leading hand. This applies to furnacemen, ladlemen, dressers, etc., who may then be upgraded for proficiency. However, they lack proper status and the advantages that an apprentice derives from school instruction. In some quarters, serious thought is being given to foundry training courses and it may be possible in the near future, to open new avenues to youth in the foundry industry. Apart from seeking skilled tradesmen from overseas, this more recent development could be the answer. Generally, the employment in the industry could be higher if the skilled men were available, and it is recognized that throughout the Australian engineering industries, the ratio of unskilled to skilled men is at its absolute limit.

There is no doubt that foundry occupations are considered to be dirty and that there are some foundries where working conditions would have been a disgrace to our grandfathers. This is a condition common the world over, but it has a grave effect in discouraging labour. There is no excuse for dirty or unhygienic foundries, and in the more recently built foundries, working conditions have been brought up to world standard. There was a tendency in the early post-war years to glamorize



(Photo by courtesy Vickers Ruwolt Pty. Ltd.)

FIG. 9.—*Two steel castings produced at the Vickers Ruwolt foundry; each weighs approximately 10½ tons.*

industry generally, however, to-day there is a saner approach to labour's requirements to do an efficient clean job. Such factors as proper lockers, washing arrangements, medical inspections against industrial diseases, etc., are gradually being adopted as a means of obtaining more efficient work.

Minimum rates of pay are determined by adding margins for skill to a basic wage. An employer may add a merit margin above this again to a man who is doing a proficient or valuable job in a respective plant. At the present time, new margins are being fixed by law and it may be sometime before all categories of work are rated for skill. Any adjustment of the basic wage has a direct effect upon the overall wage and is based upon a forty-hour week.

During the recent post-war years, there has been a number of attempts to decentralize industry. The principal object has been to attract new sources of labour. Generally, this has been successful in regard to non-skilled personnel, and the standard of labour has been higher, due possibly, to the lack of competition from other similar industries. However, the task of the supervision and the skilled tradesmen is greatly increased under these conditions, and only industries whose operations can be degraded are likely to prosper.

Equipment and Control

Prior to world war II, with the exception of the steel industry, the foundry using the modern concept of control was an oddity and generally it was

found to be due to overseas influence that demanded such control. As a natural follow-on, there was also a lack of so-called modern equipment which follows control. During and since the war, there has been a change towards the adoption of control methods and better equipment. This was primarily due to the advent of engineering specifications to cover other casting-properties besides accurate shape. It has become more apparent that quality and a competitive price are two essentials that a successful foundry has to produce besides castings, and the only way to do it is with good control and equipment.

Very few foundries are as yet making full use of metallurgists for control purposes. Most foundries attach their metallurgists to the laboratory rather than employ them in the foundry, and not too infrequently is it assumed that laboratory control is the paragon at which to aim. Some of the larger foundries are using metallurgists and technical staff in supervisory capacities, and using the laboratory as a service department.

The greatest advances in control, and adoption of modern melting and moulding methods have been made in the repetition foundries. Quality control methods have still to be exploited and the use of inspection still remains on the basis of weeding out the defective castings.

Melting Methods

The principal method of melting iron is in the cupola. A great many of the smaller foundries have yet to appreciate the technology of cupola operation and little use is made of the simple control-instruments for blast-furnace pressure measurement. A few have installed automatic blast-control equipment, but as yet, there are no cupolas equipped with blast moisture control plant. The low fixed carbon-content of the coke necessitates lower metal-to-coke ratios than are practised overseas, and ratios of 6 to 1, or lower, are common. Recent experiments with oxygen enrichment of the blast show promise of offsetting the poor coke quality, but the economics would preclude its use from most foundries. Successful experiments and operations have been carried out with a water-cooled cupola, using a basic lining, and this may be a lead to improved cupola-techniques in Australia. One large furnace, melting 180 tons per day, utilizes a water jacket in place of a refractory lining in the melting zone. Refractory practice in the cupolas is almost entirely acid, and basic-lined cupolas are rare. Originally, electric melting was restricted to the production of special alloy irons, but melting in direct and indirect arc furnaces is finding wider favour as an answer to the production of uniform-quality hot metal. (See Fig. 10.)

Steel foundries are mainly equipped with direct arc furnaces; for example, Commonwealth Steel Company is equipped with a 10 ton nominal direct are furnace which is operated at 15 to 16 tons. Side-blown Tropenas are still used by the smaller foundries; at B.H.P. Newcastle, use is made of open-hearth steel.

Non-ferrous melting is mainly carried out in crucible furnaces, and oil firing has been adopted as the most flexible and efficient means of heating, although the fuel has to be imported.. The uncertainty of the town's gas supply and its high cost has caused foundrymen to reject it as a fuel, although it may again come into favour in Victoria when the brown-coal gasification plant is installed at Yallourn, and the price of gas reduced to make it more competitive with other fuels.

Electric melting in indirect-arc and low-frequency furnaces is practised, but only to a limited extent. The high capital cost of such equipment restricts its adoption.

Moulding Practice

The moulding practice in the jobbing foundries established pre-war, has not greatly altered or progressed. There is still a diffidence by jobbing foundries to the adoption of mechanization as an aid to production, and therefore, with the exception of some of the large steel and iron foundries, techniques of moulding are not

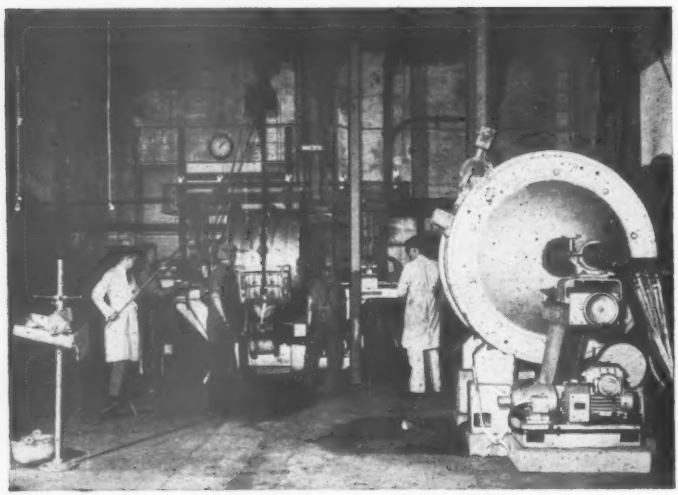


FIG. 10.—*Indirect-arc "Detroit"-type rocking furnaces installed at Russell Manufacturing Company, Proprietary, Limited, Melbourne. These 530-k.v.a., ½-ton capacity, furnaces were built in Australia, and are used for melting grey cast iron in the piston-ring foundry.*

(Photo by courtesy Russell Manufacturing Co. Pty., Ltd., Division of Repco Ltd.)

up-to-date with world practice. In repetition foundries, especially the captive class, however, considerable advancement has been made in the adoption of sand-handling plants, sandslingers, and various types of moulding and core-blowing machines. A number of smaller foundries have devised their own sand-handling equipment to meet the local conditions. Generally, the foundries are not conscious of material-handling problems, and a great deal of waste labour results in man-handling foundry materials. This situation is likely to be remedied since a number of local engineering firms are now specializing in the supply of such equipment which hitherto had to be imported.

The automotive industry has set up foundries which are examples of good materials handling and mechanization, and these plants are modified versions of the larger organizations operating overseas. The standards operating in these plants are the same as the parent companies overseas, and therefore, their efficiency can be considered as comparable with world class.

Taking the overall picture, there are about twenty foundries situated throughout the States that are well-planned and equipped with modern machinery. The majority of these foundries have been built or rebuilt since the war and incorporate improved methods of materials handling, mould conveyors, shakeouts, etc. Like the automotive-industry foundries, these are producing specialized repetition-castings for the hardware and small machine tool and refrigerator industries.

Costing

Considering the financial side of foundry operations, most jobbing shops still charge for castings at a price per pound, rather than a price per casting. The repetition foundries by necessity are charging a price per casting and are generally conscious of costing methods. In discussions concerning costing, the foundry owner is reticent, which is usually an admission that his methods consist of a native sense of values coupled with experience, but with no real knowledge of a sound costing-system. Rising costs and keener competition will eventually force the industry in Australia to adopt the principles of costing that have been so successfully employed in the repetition engineering trade.

Research and Development

Research and development as applied to the commercial founder, consist essentially of finding answers to his everyday problems, and in that respect, the Australian foundryman is virtually unassisted. Only two organizations are undertaking this work—the Commonwealth Scientific and Industrial Research Organization and the Defence Standards Laboratories; the former body is performing organized work on foundry sands—a very small field, and the latter is doing general investigations, but the majority of its efforts must be towards government works as its name implies. This lack of research is a serious disadvantage that industry has to face, and only the larger foundries can carry out work of this nature. The result is that while the problems are being tackled by many private firms, a great deal of effort is wasted through lack of co-ordination. There is a very great need for a national institution, backed by industry, to carry out such work.

In regard to fundamental research, work is being done by the Universities, CSIRO and the Defence Standards Laboratories, and notable contributions have been made on the subjects of sand-analysis methods, metallurgy of aluminium alloys, and properties of metals and alloys. On a highly practical basis is the work being done at the University of Melbourne on the preparation of metallurgical coke from brown-coal briquettes.

AUSTRALIA TO-MORROW

Australia is still a young country insofar as her secondary industry is concerned, and it will be many years before she can be considered as comparable with the industrial centres of England, USA and Europe. Through dire necessity of war, complex industries such as the aircraft industry have been built and successfully operated from a technical standpoint. One of the problems that faces Australia to-morrow is the maintenance and growth of the secondary industries. The manufacture of articles must be carried out on an economic basis, the standard for which is set by England and USA. Protective tariffs are a partial solution to high costs, but have the disadvantage of restricting normal trade, and they may, in some instances, rebound. A healthier solution is the encouragement of overseas capital and labour to establish new ventures in Australia, and to improve existing plants in order to produce at a rate which is economic.

The Commonwealth and State Governments have active policies directed at encouraging capital and labour to this country, and the results of their efforts have been highly successful. Many overseas firms have started Australian divisions and are finding their operations very profitable. There is little need to comment on the number and high quality of the immigrants who have made Australia their new home. The effect of this is to increase the home markets and to lower the cost of production. The ultimate aim must be to lower costs to a level which is competitive on the world market.

Foundry Industry Developments

The automotive and domestic-appliances industry will most likely contribute the major portion of expansion in the near future. A large mechanized grey-iron foundry is being erected in Victoria, employing indexing moulding-machines, hot-blast cupolas, and expecting to employ 250 personnel eventually on the production of castings for slow-combustion stoves, soil pipes, fittings, etc.

Hot-blast cupolas have not been used in the country previously and their successful operation may offset the problem arising from the poor quality of Australian coke. In New South Wales, a completely-automatic bath-moulding plant is being erected to meet the increased demand of the housing industry. All sections of the automotive industry are expanding and foundry expansion projects are under way at the major companies.

The Foundry Industry in Australia

There is little expansion activity in the jobbing foundries and the main activity seems to be occurring in the captive foundries, whether jobbing or semi-repetition. The technical advances in the captive foundries include the production of spheroidal-graphite cast-iron and the adoption of the shell-mould process.

It is probable, that over the next five years, a greater amount of money will be invested in new foundry equipment than at any time previously. An added stimulus to lower production-costs will be a continued effort to de-skill foundry processes to offset the labour shortage.

The formation of foundry training colleges in Melbourne and Sydney will eventually be the answer to the supply of skilled labour for foundry operation, though this is unlikely to be effective under five years. It is the intention of the organizers of these courses to train young men in every sphere of modern foundry operation so that the graduate from such a course will have a good appreciation of moulding, melting, mechanical handling, foundry metallurgy and foundry management. All of these subjects can be studied separately at present, but there is no correlated course.

The future of raw materials for the industry is very good and it is unlikely that there will be any shortages in metal supply. The production of aluminium ingot in Tasmania should boost the light alloy foundry industry, since there has been difficulty in the past of obtaining sufficient supplies of aluminium. There does not appear to be any prospect in the near future of the supply of graded moulding sands, although one company in Melbourne has plans for ultimately operating a continuous washing plant for the supply of graded free sand.

The Future

A basic requirement for the future development of the industry in Australia is the establishment of a foundry research centre, capable of carrying out major investigations on behalf of the industry. A second need is for greater competition in the supply of raw materials to promote quality and prompt deliveries.

In the foundries themselves, greater attention must be paid to the elimination of wasted effort and wasted time, and a better utilization of manpower. Very few foundries appreciate the enormity of material and equipment to be moved in casting a ton of metal, and until the foundries grasp the importance of these money-wasting factors, no great improvement will be made in the reduction of costs. While costs remain high, the margin for quality will remain necessarily low.

Acknowledgment

The Author wishes to acknowledge and thank Mr. H. A. Stephens for his invaluable assistance and advice in the editing of this Paper, and Miss L. Hillier who assisted in the arrangement of its presentation. A large number of people and organizations throughout the industry willingly gave the advice and information that made the Paper possible and the Author wishes to acknowledge the following:—Department of Industrial Development; Broken Hill Proprietary Company, Limited; Western Australian Government Railways; Queensland Railways; New South Wales Government Railways; Victorian Railways; Commonwealth Railways; Transport Department, Tasmanian Government; Vickers Ruwolt Pty., Limited; General Motors-Holden, Limited; State Electricity Commission of Victoria; Repco, Limited; Commonwealth Press Relations Office; Mr. G. D. Nash; Abel Lemon Pty., Limited; Allied Iron Founders Pty., Limited, and Mr. A. A. Robinson.

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[15] "Foundry Sand Resources of South Australia," by H. S. Cornelius and H. A. Stephens. *Bulletin* No. 190, C.S.I.R.O., Commonwealth of Australia; pages 26, 32.

[16] "Report of Foundry-sand Investigation Committee." *Proceedings* of Institute of Australian Foundrymen, Victorian Division, volume 2, 1940; pages 130, 140, 142.

[17] "Moulding Sands," by K. R. Miles and H. A. Stephens. *Bulletin* No. 5, Department of Mines, Mineral Resources of Western Australia, Western Australian Government; pages 34, 50, 54.

[18] "Progress"; issued by the Broken Hill Proprietary Company Limited; page 47.

Indian Symposium on Special Steels

A symposium on production, properties and applications of alloy and special steels will be held from February 1 to 3, 1956, under the auspices of the National Metallurgical Laboratory at Jamshedpur, India. The objects of the symposium will be fourfold:—(*i*) To draw attention to the usefulness of stepping up this industry along scientific lines; (*ii*) to indicate to the engineering industries, such as, automobile, railway, defence, aircraft, chemical industries, the need to rationalize demands and fall in with specifications of alloy steels which can be made from Indian raw materials; (*iii*) to define satisfactory grades of alloy steels based on such alloying elements as are indigenously available in India, and (*iv*) to discuss special equipment and practice required in steelworks for producing these steels and the materials, including ferro-alloys, involved in their production.

Recent Wills

WHITE, H. E., chairman of the Carron Company, ironfounders, of Falkirk	£109,975
JEFSON, J. H., formerly a director of Morecambe Electrical Equipment Company, Limited	£43,426
NICHOLAS, J. H., secretary of Isaac Braithwaite & Son, Engineers, Limited, Kendal (Westmorland)...	£10,966
CLARKE, ERNEST, founder and joint managing director of Clarkes (Redditch), Limited, spring manufacturers	£21,323
JORDAN, ROGER, a former secretary of Joseph L. Thompson & Sons, Limited, shipbuilders, of Sunderland	£4,290
BURSTON, ANNIE, formerly a director of John Maddock & Company, Limited, malleable ironfounders, of Oakengates (Salop)	£9,485
CAUTLEY, H. A., late a director of Dunderland Holdings, Limited, and the Dunderland Iron Ore Company, Limited	£20,006
THORNYCROFT, I. T., for many years a director of John I. Thornycroft & Company, Limited, shipbuilders, of Cowes (I.o.W.)	£157,075

British Steel Castings Research Association

Second Annual Report, covering the period April 1, 1954, to March 31, 1955

[Abridged]

GENERAL

The year saw the continued growth of the work of the British Steel Castings Research Association, and of its reputation and usefulness within the steelfounding industry as well as amongst kindred organizations at home and abroad. Not only was this the first year of operation as a Department of Scientific and Industrial Research grant-aided research association, but in the same period plans were completed for the erection in Sheffield of new headquarters premises, including laboratory and experimental foundry, without which it would be impossible for the Association to realize its full potential as the collective research organization within the steelfounding industry. Major administrative changes within the Association were also made during the year.

DSIR Grant

Members were notified on June 1, 1954, of the successful outcome of the Association's application to the DSIR for grant aid, the Department having agreed to contribute to the Association's income for a period of five years from April 1, 1955. The basis of this grant is that, provided the Association raises from industry an annual income of £30,000, the DSIR will make a block grant of £15,000, and for every £100 by which grant-earning industrial income exceeds £30,000 the Department will also contribute £100 up to a maximum additional annual grant of £10,000.

Apart from the purely financial advantage of this arrangement, the Association now enjoys an enhanced status in scientific and technological circles and is provided through DSIR machinery with an accepted means of inter-communication with other research associations.

The Department nominated Dr. M. A. Vernon as its representative on the Association's Council. It is the usual practice of DSIR to appoint two Visitors to each grant-aided research association, but such appointments have not yet been made to BSCRA.

Membership

The Union Steel Corporation (of South Africa), Limited, were admitted to ordinary membership of the Association on March 30, 1955. The present membership is 45 companies. A number of enquiries for membership or associate membership were received, many of them from foundry-supply companies.

Finance

The industrial income of the Association was provided by a contribution of £8,550 from the British Steel Founders' Association and by subscriptions from members paid in accordance with the basis of calculation agreed to at the general meeting of the Association held on December 2, 1953. These arrangements provided that, subject to a minimum annual subscription of £250, subscriptions are calculated as a logarithmic function of wages paid to steelfoundry employees. A useful contribution to income has been received from the sale of the BSCRA exposure calculator for gamma radiography, Mark II and III versions of which are now on the market.

The income and expenditure of the Association is regulated by the Council, with the advice of its finance committee under the chairmanship of Mr. Frank Rowe, not only to provide for the building and equipment out of revenue of the new research station that is to be built in 1955-56, but also to establish a reserve fund approximately equivalent to one year's industrial income at the end of the first quinquennium of DSIR grant aid.

Research Station

The need for providing the Association with laboratory, workshop and experimental foundry facilities of its own has been apparent to Council for some time. The facilities at Broomgrove Lodge are exceedingly limited, being confined to one general laboratory and workshop and one microscopy laboratory accommodated in the basement. The leasehold of a site of approximately 5,164 sq. yd. at Petre Street, Sheffield, was therefore secured in February, 1955, on an 800-year term, general approval having previously been obtained from the local planning authority for the erection on it of premises comprising laboratories, experimental foundry, workshops, and offices. It is expected that the buildings will be completed and the equipment installed by the spring of 1956. The accommodation to be provided at Petre Street will enable the Association to vacate the premises that it is at present sharing with the British Steel Founders' Association at Broomgrove Lodge and No. 20, Broomgrove Road. The site provides adequate scope for future extensions—the building to be erected initially occupying only about half the area that has been leased.

On December 10, 1954, Council appointed a research-station committee under the chairmanship of Brigadier A. Levesley, to supervise the progress of the scheme. The committee is composed of the chairman of Council (Mr. C. H. Kain), the chairman of the finance committee (Mr. Frank Rowe), and the chairman of the research committee (Dr. E. Gregory). Valuable assistance has been rendered by Brigadier Levesley in connection with the preliminary proposals and negotiations which preceded the formulation of the scheme that was adopted.

British Steel Castings Research Association

Technical Advisory Committees

The Association continues to receive the advice of a number of technical advisory committees and panels in relation to the execution of the programme of research authorized by Council on the recommendation of the research committee under the chairmanship of Dr. E. Gregory. The existence of these committees provides a direct line of contact between the Association's staff and members of the Association, thus producing valuable co-operation on the technical issues involved, which not only assists the progress of the work but ensures that the results of research are made available to the industry in forms most suitable for their assimilation into practice.

These technical advisory committees form a convenient channel through which the Association can arrange for practical trials to be undertaken as required in member foundries, and also provide a means for the Association to gain the advantage of expert knowledge from outside the industry; representatives of the Service Departments, of consumer interests, and of academic institutions are members of several of the active panels.

In addition to the direct contribution to the work of the Association made by these advisory committees, their value to the members whose representatives serve on the committees must also be recognized; the contacts that each committee member is able to establish and maintain is frequently of considerable value to the individual and his company.

It is anticipated that there may be work for two to four meetings per year in each of the major fields of research—steelmaking and refractories, foundry processes and moulding materials, plant engineering and metallurgy; and with this in view, some reorganization of the technical advisory committee structure may be advantageous. The refractories panel and the steelmaking committee have already agreed to merge and it is thought probable that similar arrangements may be practicable in regard to some of the metallurgical committees and panels that were previously appointed. Such arrangements would be aimed at improving the efficiency of the Association's committee structure, and would, of course, be undertaken in consultation with the committees themselves.

Extramural Research

An important feature of the work of the Association lies in the use of facilities provided in extramural laboratories for the prosecution of fundamental research work. At Cambridge University, research into metal penetration of mould refractories and related phenomena has proceeded under the supervision of Dr. T. P. Hoar; at Reading University, Dr. P. F. Holt and his collaborators pursued their bio-chemical research into the causes of silicosis, Dr. Holt's work has also provided a basis for a new technique for assessing the dust hazard; and at Sheffield University Professor A. G. Quarrell and Dr. J. White continued to assist the Association by undertaking a number of investigations, mainly connected with moulding materials, and the provision of laboratory facilities.

The Council has pleasure in placing on record the Association's thanks to these Universities and supervisors, and also to Mr. F. H. Keating and Mr. L. Smith, of Imperial Chemical Industries, Limited, Billingham, and Dr. L. Northcott and Mr. H. F. Hall of the Armament Research Establishment, Woolwich, who undertook all the low-temperature impact testing required by the Association for the investigation of the low-temperature properties of steel castings.

Library and Information Service

The first function of the Association's library is the collection of foundry periodicals from all countries. There are also collections of reports, pamphlets, specifications and trade catalogues, with a smaller number of selected books. Bibliographies and translations are prepared and made available as required.

Through extensive interchange arrangements the library is able to trace and supply on loan almost any published item bearing on steelfoundry science and technology. During the year, the library made some 600 loans to users other than the Association's staff.

Enquiries received during the year varied in nature between those which were answered by the loan of an item from the library and those which involved advice from the research staff or an official reply on behalf of the Association.

Some 150 enquiries were answered during the year. This figure excludes simple inquiries of a routine nature. The subjects covered were very varied, but some prominence attached to the L-D process of oxygen refining, cupola practice, shell moulding, investment casting, CO_2 Process for hardening moulds, centrifugal casting, identification of steel designations, American standard specifications, and manganese steels.

Relations with Kindred Organizations

Cordial relations were established and maintained between the Association and all the principal research associations and technical institutions whose work relates to steelfoundry technology. Contact is maintained between the Association's staff and the staffs of many organizations whose work is related to that of the Association.

Mr. J. M. Middleton of the Association's staff contributed a second paper on "Influence of Mould Materials on the Incidence of Hot-tearing in Steel Castings" to the American Foundrymen's Society for presentation to their 1955 annual convention. He, with Dr. J. A. Reynolds, Professor A. Preece and Dr. J. White has also had a Paper accepted by the Institute of British Foundrymen for presentation to the International Foundry Congress in London in 1955. This Paper reviews several aspects of the Association's researches in relation to steelfoundry moulding materials, and into solidification phenomena associated with steel castings.

Staff

A number of changes occurred in the staff of the Association, which resulted in a slight reduction in the numerical strength. It is visualized that, with the replacements of scientific staff now being sought the present staff will be just sufficient to maintain the various activities of the Association during the coming year, so that further recruitment can be deferred until the new research station has been built. It is, however, recognized that the present level of staff is at a minimum for the effective operation of the Association on its present scale, and that no new work can be undertaken without additional personnel.

Mr. J. F. B. Jackson, who had been director of research since the inception of the Association's predecessor, the Research and Development Division, BSFA, in 1950, left the Association in October, 1954, to take up an industrial appointment. He was succeeded by Emeritus Professor R. J. Sarjant, O.B.E., D.SC., F.I.M., who had been assisting the Association since November, 1953, in an advisory capacity. Subsequently, Council appointed Dr. A. H. Sully, PH.D., M.SC., F.I.M., F.INST.P., to be the future director of research. In order to enable Dr. Sully to become acquainted with all the members of the Association, their problems and the work of the Association, and also to provide opportunity for him to visit and study current steelfoundry practice abroad, Council invited Dr. R. J. Sarjant to act as director of research for a year with Dr. Sully as associate director. Dr. Sully took up his appointment on March 14, 1955.

As the result of the incorporation of the Association as an integral unit of DSIR and the formulation of the plan to build a new research station, it was decided by Council in November, 1954, to establish an independent administration for the Association. Mr. John Bolton, technical secretary of the Research Association since 1951, was appointed secretary. Council wish to thank Mr. Barber, secretary of the British Steel Founders' Association, and previously secretary of the Research Association, for his help and valuable services during the reorganization.

Of the research staff, Dr. J. A. Reynolds, Mr. G. Cheetham, Mr. B. Rayner and Mr. D. Stewart resigned during the year to take up industrial appointments. Mr. W. J. Jackson, M.SC., A.R.I.C., A.I.M., has replaced Mr. Cheetham, and replacements for Mr. Rayner and Mr. Stewart are now being sought.

RESEARCH

Having regard to the limited resources of the Association in terms of both staff and facilities, very substantial progress has been made towards completion of the programme of research for the year 1954-55. The following summaries indicate the progress made.

Mechanism of Freezing

In 1950, the Research and Development Division of the British Steel Founders' Association sponsored two full-time fundamental research projects designed to study the mechanism of freezing of steel castings. These projects, conducted at Imperial College, London, and King's College, Newcastle-upon-Tyne, were completed at the end of 1953. Work in the past year has been concerned with the task of incorporating the detailed results of the completed investigations into the framework of recent research progress in this field in order to clarify the most outstanding of unsolved problems and hence to guide any future research that might be undertaken.

The contributions made by the Association's work may be broadly summarized as having the following main features:—

(*a*) The investigations have thrown light on the fundamental relationship between the mechanism of freezing and the tensile properties of cast steel.

(*b*) Some of the major factors of casting practice which control the mechanism of freezing, and hence the tensile properties of steel, have been evaluated.

(*c*) Three experimental techniques have been developed. These may prove to be of considerable value in the future progress of research in this field.

To elaborate these features:—

(*a*) *Mechanism of Freezing and the Tensile Properties of Steel.*

This problem is one that has exercised the attention of steelfounders for many years. In the experiments it was confirmed that the form and distribution of shrinkage unsoundness in steel castings depends to a large extent on the form of the macro-crystal-structure. Columnar-crystal growth was found to be almost invariably sound and to exhibit in consequence uniformly-high tensile properties. Other forms of crystal growth, however, namely, the equiaxial and nuclear types, were found to exhibit low and variable ductilities, averaging about 65 per cent. and never exceeding 80 per cent. of those of the columnar zones. Radiographic examination of thin steel sections has revealed that this defect is due to small interdendritic cavities (microporosity) which are widely dispersed, to a greater or lesser degree of severity, throughout the central regions of steel castings. Measured in terms of its effect on tensile properties, there is no systematic relationship between the severity of this defect and the size or type of the crystals affected. This difference in soundness is due to a marked change in the mechanism of crystal growth. Columnar crystals grow parallel to each other in one direction; equiaxial and nuclear crystals grow multi-directionally in such a way that complete feeding is almost impossible.

It has been shown that this difference in the two mechanisms of crystal growth is controlled primarily by the number and distribution of crystal nuclei present in the melt as pouring is completed and not by the magnitude of the temperature gradients set up during solidification in the mould.

(*b*) *Factors of casting design and practice which control the macrostructures of steel castings.*

Four major factors of casting design and practice have been studied in detail: the mass of the casting,

British Steel Castings Research Association

the size and shape of the feeder-head, the orientation of the casting with respect to the feeder-head and to gravity, and pouring temperature.

The first and last of these factors, together with the rate at which the melt cools to the liquidus, determine the number and stability of crystal nuclei present in the melt and hence, ultimately, the extent of columnar growth and the fineness of equiaxial and nuclear crystals occupying the centre of the casting. The orientation of the casting and the position of the feeder-head together determine the character of the gravity settling of crystal nuclei which influence the macrostructure.

Variations in the size and shape of the feeder-head (expressed in terms of volume: surface-area ratios) have been shown to bear a close relationship to the incidence of gross unsoundness in a test casting. Such unsoundness can be eliminated if the v:a ratio for the feeder-head exceeds that of the casting by about 20 per cent. Soundness is thus most economically achieved using top-feeding from a tall cylindrical "chimney" type of head.

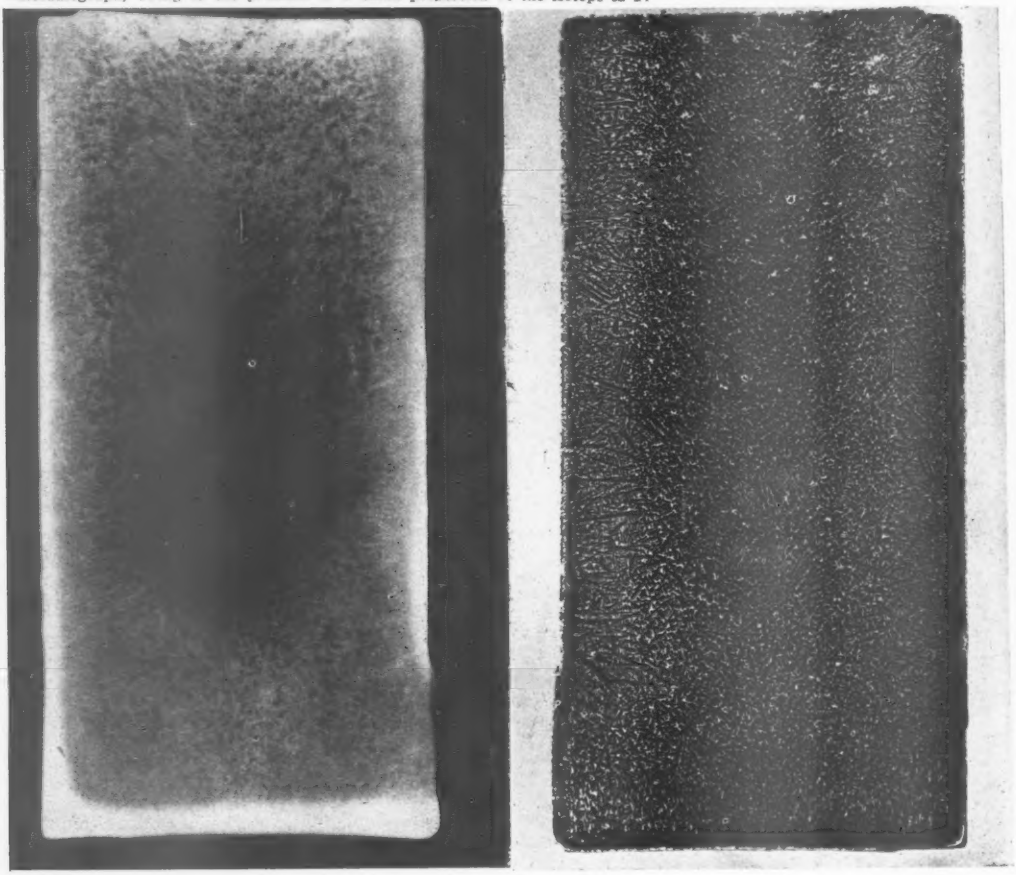
(*c*) *Experimental Techniques.*

The direct-measuring thermal-analysis technique has been applied to experimental steel castings at London University, the investigators being among the pioneers in developing the method to a suitable degree of accuracy. The method has so far seen little direct application to foundry problems, but it should be an increasingly valuable tool in further research.

Under the Association's sponsorship, pioneer work at Newcastle-upon-Tyne has also been carried out in an attempt to follow the process of feed-metal flow using radioactive tracers (Fig 1). In this particular application, difficulties of interpreting the

FIG. 1.—*Use of radioactive tracers for studying Feeding problems.*

Autoradiograph (left) and photomicrograph (right) of a section from a steel ingot cast as part of an investigation into the application of radioactivity tracers for studying feeding problems. The segregation pattern of phosphorus is revealed in the autoradiograph, owing to the presence of a small proportion of the isotope 32 P.



results have proved greater than anticipated, but the method has been used to study convection in steel and promises to be most useful in permitting, for the first time, quantitative study of the process of micro-segregation and its relationship to inter-dendritic (micro) porosity and the tensile properties of cast steel.

Finally, the popular methods of simulation using stearin wax have been closely examined, and it has been confirmed that with this material, the essential characteristics of the solidification process in steel castings, namely, heat-transfer, crystal-growth and shrinkage characteristics, may be closely imitated in wax models. The results obtained hold out considerable hope that it may be possible ultimately to establish this simulation on a sound quantitative basis so that the mode of solidification of steel castings may be explored experimentally by simple methods.

These results have recently been published to members as BSCRA *Research Reports*, and some of this material formed the basis of Part I of the Association's Paper to the International Foundry Congress in London in June, 1955.

The work has emphasized two scientific problems which have been included in the 1955-56 programme, namely, the further study of microporosity and the use of simulation techniques.

(To be continued)

Increases in Capital

ETRUSCAN ENGINEERING COMPANY, LIMITED, Hanley, Stoke-on-Trent, increased by £20,020, in £1 5 per cent. cumulative redeemable "A" preference shares, beyond the registered capital of £3,500.

S. E. HAWARD & COMPANY, LIMITED, iron, steel, and tinplate stockholders, etc., of Tunbridge Wells (Kent), increased by £42,000, in £1 ordinary shares, beyond the registered capital of £23,000.

HENRY KELLAND & COMPANY, LIMITED, manufacturers of agricultural machinery, etc., of Bridgwater (Somerset), increased by £14,000, in £1 ordinary shares, beyond the registered capital of £16,000.

COVENTRY CLIMAX ENGINES, LIMITED, increased by £200,000, in 100,000 5½ per cent. cumulative redeemable preference and 100,000 ordinary shares of £1 each, beyond the registered capital of £300,000.

NORFOLK (RYBURGH) FOUNDRY COMPANY, LIMITED, increased by £10,000, in 5,000 ordinary shares of 10s. and 7,500 7 per cent. cumulative preference shares of £1 each, beyond the registered capital of £5,000.

J. AVERY & COMPANY (EST. 1834), LIMITED, merchants and manufacturers of pressings, forgings, etc., London, E.C.2, increased by £45,000, in 5s. ordinary shares beyond the registered capital of £7,000.

DARTMOUTH MANUFACTURING COMPANY, LIMITED, manufacturers of range boilers, metal furniture, etc., of West Bromwich, increased by £50,000, in 1s. ordinary shares, beyond the registered capital of £50,000.

M. W. WALKER & STAFF, LIMITED, ironfounders, electrical and mechanical engineers, etc., of London, E.C.3, increased by £45,000, in £1 ordinary shares, beyond the registered capital of £10,000. On February 28, 1955, Crowden & Keeves, Limited, was allotted 42,900 shares.

EDMUNDSONS CONSTRUCTION COMPANY, LIMITED, electrical and mechanical engineers, etc., of London, S.W.1, increased by £49,900, in £1 ordinary shares, beyond the registered capital of £100. The above increase is for the purpose of acquiring part of the undertaking of Edmundsons Electric Company, Limited.

BURNETT & ROLFE (HOLDINGS), LIMITED, engineers, etc., of Rochester (Kent), increased by £103,900, in 44,000 7½ per cent. redeemable cumulative preference, 19,900 "A" ordinary, and 40,000 "B" ordinary shares, all of £1 each beyond the registered capital of £100. The 100 ordinary shares of £1 in the original capital have been designated "A" ordinary shares.

Company News

BENTLEY ENGINEERING COMPANY, LIMITED.—Sears Holdings, Limited, under the chairmanship of Mr. Charles Clore, proposes to make a share exchange offer for the 4s. ordinary and "A" ordinary shares of the group. For each Bentley share, holders will be offered one 5s. "A" ordinary share in Sears Holdings.

WILLIAM JACKS & COMPANY, LIMITED—The board announces a final dividend of 12½ per cent. to make a 20 per cent. total for 1954 on an ordinary capital increased by a 50 per cent. scrip issue to £409,950. The compares with a 15 per cent. final to make 25 per cent. on £273,300, equal to 16⅔ per cent. on the present capital and representing an effective increase of 3½ per cent. Including investment income, etc., of £65,034 (£43,458), the group profit of £330,031 compares with £228,918.

ENGINEERING COMPONENTS, LIMITED—The result of the offer of 750,000 5s. ordinary shares at 8s. per share, which closed on August 15, is that acceptances totalled 724,516 shares, or approximately 97 per cent. There were 477 excess applications totalling 248,171 shares for the balance of 25,484 shares. Applications for up to and including 50 shares have been allotted in full; applications above this figure were scaled down and received from between 5 per cent. and 2 per cent. of the amount applied for.

ACROW (ENGINEERS), LIMITED—The year to March 31, 1955, proved the most successful so far, consolidated trading profits amounting to £499,250, a rise of some £39,000 over the previous record of £460,139 achieved in 1953-54. A final dividend of 15 per cent. is recommended on the present £350,000 ordinary, against 10 per cent. on £300,000 a year ago. The interim was 20 per cent. on £300,000, the same rate as paid previously on £250,000. Total net cost is up from £44,000 to £64,687.

JOHN BROWN & COMPANY, LIMITED—Trading prospects for each of the enterprises in which the group is concerned appear to be good so long as general economic conditions remain stable, Lord Aberconway, chairman, informs stockholders in his review with the accounts to March 31. The output of Cravens, Limited, both in the number of carriages and wagons and in value was the highest ever recorded. Stockholders are also informed that total colliery compensation received by the group, completed but for minor items, amounts to £2,232,742.

A. P. V. COMPANY, LIMITED—Acceptances were received for about 92½ per cent. of the 528,620 ordinary shares offered by the company (formerly the Aluminium Plant & Vessel Company, Limited) to ordinary shareholders by way of rights at 14s. a share. The additional shares available were subscribed over two and a half times. Allotments were:—Up to 100 shares, in full; 101 to 1,000 shares, 50 per cent., with a minimum of 100 shares; over 1,000 shares received approximately 23½ per cent. with a minimum of 500 shares. The offer of £1.500.000 5 per cent. first mortgage debenture stock, 1980-85, at 99 per cent. to ordinary, preference, and loan stockholders, was undersubscribed, and underwriters had to take up 68 per cent. of the issue.

ALL PLACES have now been booked for the Foundry "Supervisors' Course," organized by the Council of Ironfoundry Associations, which is to be held at the National Foundry College, Wolverhampton, from September 12 to 16.

British Blast Furnaces in the June Quarter, 1955

(These tables are published through the courtesy of the British Iron and Steel Federation.)

Derbyshire, Leicestershire, Notts, Northants, and Essex.

Name of firm.	In blast at end of the second quarter, 1955.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Clay Cross Co. (Iron & Foundries)	—	—	1	—	1	1	2
Ford Motor	—	—	—	—	—	0·9	1
Holwell Iron	—	—	3	—	3	3	4
Kettering Iron & Coal	—	—	2	—	2	2	2
New Cransley Iron & Steel	—	—	1	—	1	1	2
Renishaw Iron	—	—	2	—	2	2	2
Sheepbridge	—	1	1	—	2	2	2
Stanton Ironworks: Stanton-by-Dale	—	—	5	—	5	4·5	5
Staveley Iron & Chemical	—	—	4	—	4	4	4
Stewarts and Lloyds: Corby	—	3	—	—	3	3·6	4
Wellingboro' Iron	—	2	—	—	2	2	3
TOTAL	—	6	19	—	25	26	31

Lancashire (excl. N.-W. Coast), Denbighshire, Flintshire, and Cheshire.

Brymbo Steel	—	1	—	—	1	0·8	1
Darwen & Mostyn	—	—	—	1	1	1	2
Lancashire Steel Corp'n.	—	2	—	1	3	3	3
Summers, J.	—	1	—	—	1	1	1
TOTAL	—	4	—	2	6	5·8	7

North-West Coast.

Barrow Ironworks	2	—	—	—	2	1·9	4
Charcoal Iron	—	—	—	—	—	0·8	1
Millom & Askam	2	—	—	—	2	2	3
United Steel: Workington	2	—	—	1	3	3	3
TOTAL	6	—	—	1	7	7.7	11

Lincolnshire.

Appleby-Frodingham	—	4	—	—	4	4	6
Lysaght's Scunthorpe Works	—	3	—	—	3	3	3
Thomas, R., & Baldwins: Redbourn	—	3	—	—	3	3	3
TOTAL	—	10	—	—	10	10	12

North-East Coast.

Consett Iron	—	3	—	—	3	3	3
Dorman Long (Steel): Acklam	—	2	—	—	2	2	4
Redcar	—	2	—	—	2	2	2
Cleveland	—	2	—	—	2	2	4
Bessemer	—	2	—	—	2	2	3
South Bank	—	—	—	2	2	2	3
Gjers, Mills & Co.	2	—	—	—	2	2	5
Normanby Ironworks	2	—	—	—	2	2	3
Skinningrove Iron	—	1	—	—	1	1	3
South Durham Steel & Iron:							
West Hartlepool	—	2	—	—	2	2	2
Cargo Fleet	—	2	—	—	2	2	2
TOTAL	4	16	—	2	22	22	34

Scotland.

Bairds & Scottish Steel: Gartsherrie	—	2	1	—	3	3	5
Carron	—	—	1	—	1	1	4
Colvilles: Clyde Works	—	3	—	—	3	3	3
Dixon's	—	2	—	—	2	2	6
TOTAL	—	7	2	—	9	9	18

South Wales and Monmouthshire.

Briton Ferry Works	1	—	—	—	1	1	1
Guest Keen Iron & Steel: Cardiff	1	2	—	—	3	3.2	4
Thomas, R., & Baldwins: Ebbw Vale	—	2	—	—	2	2	3
Steel Company of Wales: Margam	—	3	—	—	3	3	3
TOTAL	2	7	—	—	9	9.2	11

Edgar Allen's Prospects

In his statement on the accounts for the year ended April 2, Mr. W. H. Higginbotham, chairman of Edgar Allen & Company, Limited, steel and tool makers, etc., of Sheffield, says that the position with respect to orders on hand is generally good, and, despite improvement in deliveries, has improved since the beginning of April.

The forward outlook, therefore, he says, may from this standpoint be regarded as satisfactory, but the adverse effect of the recently announced advances in coal prices, and pending wage increase demands, must all be reckoned with in any forecast of results.

Rail Re-equipment

Mr. Higginbotham says that too much reliance should not be placed on the projected railway re-equipment programme as a source of increased business, as any benefit to the company will be mainly indirect and dependent on the extent to which customers obtain orders or contracts.

The parent company's profit ratio improved during the year under review by approximately 1 per cent., but the overall ratio of subsidiaries' profits to turnover declined due to less successful operations by the overseas companies.

The increased earnings of the year came mainly from the engineering and trackwork business.

The proportion of direct export business fell rather sharply, partly due to intensified foreign competition and partly to increased costs, but more particularly because of diversion of the engineering department's activities from overseas to home contracts.

Mobile Furnace for Bright Annealing

A mobile furnace mounted on four wheels which travels along rails to any one of four working positions has been added to the bright annealing plant at Bruntons (Musselburgh), Limited. The furnace, designed and supplied by the General Electric Company, Limited, is used to bright anneal lengths of cold-rolled mild and carbon-steel strips and has doors at both ends. It can be moved by a single operator, driven by a chain and sprocket through reduction gears from a hand-winding unit.

At each of the four working positions is a furnace base with a refractory hearth capable of supporting a charge of steel strip in lengths up to 7 ft., stacked to a depth of 2 ft. and a width of 2 ft. To permit adequate heat-transfer to the base of a charge, the hearth has a chequered formation. For bright annealing, the charge is sealed within a heat-resisting steel hood with down-projecting flanges which seat in sand channels around the base. The use of four bases makes possible a continuous cycle of operations comprising the loading and unloading of bases, the purging of each new charge with protective atmosphere, heating and cooling. The furnace is heated by heavy gauge nickel chrome ribbon elements.

British Blast Furnaces in the June Quarter, 1955 —*continued*

Staffordshire, Shropshire, Worcestershire, and Warwickshire.

Name of firm.	In blast at end of the second quarter, 1955.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Goldendale Iron	—	—	1	—	1	1	2
Lilleshall	—	—	1	—	1	1	2
Round Oak Steel Works	—	—	—	—	—	—	2
Shelton Iron, Steel & Coal	—	3	—	—	3	3	3
Stewarts and Lloyds: Bilston	—	2	—	—	2	2	4
TOTAL	—	5	2	—	7	7	13
Sheffield.							
Park Gate Iron & Steel	—	1	—	—	1	1.2	2
GRAND TOTAL	12	56	23	5	96	97.9	139

Weekly Average Number of Furnaces in Blast during the June Quarter, 1955, and the Previous Four Quarters

District.	1954.			1955.	
	June.	Sept.	Dec.	March.	June.
Derby, Leics., Notts., Northants, and Essex	25.8	24.2	25.8	26	26
Lancs. (excl. N.-W. Coast), Denbigh, Flint, and Ches.	6	4.2	5	6	5.8
Lincolnshire	10.3	9.3	9	9.9	10
North-East Coast	25	22.9	22	22	22
Scotland	9.1	9	9	9	9
Staffs., Shrops., Worcs., and Warwicks.	8.5	8.6	7.2	7	7
S. Wales and Monmouth	9	8.7	9	9 1	9.2
Sheffield	2	2	2	2	1.2
North-West Coast	7.5	7	7.6	7.9	7.7
TOTAL	103.2	95.9	96.6	98.9	97.9

The following companies have furnaces in course of construction or rebuilding:—John Summers; Dorman Long (Steel) (2); Lancashire Steel Corporation; South Durham Steel & Iron (West Hartlepool and Cargo Fleet); Steel Co. of Wales; Renishaw Iron; Lysaght's Scunthorpe Works.

Advisory Panel for Furnace Installations

A panel is to be set up by Smethwick Town Council to examine plans submitted by local manufacturers for the installation of new furnaces. The panel will include the town's Medical Officer of Health and Chief Sanitary Inspector, together with representatives of local manufacturers and the regional engineer of the National Industrial Fuel Efficiency Services. It has been commissioned under the Smethwick Corporation Act of 1948 which provided that no person shall instal in any building any furnace for steam raising or for any manufacturing or trade purpose unless, so far as it is practicable, the furnace is capable of being operated continuously without emitting smoke.

Mr. William Kay, the Chief Sanitary Inspector for Smethwick, said that it would be a purely voluntary scheme. "We feel," he said, "that manufacturers would prefer to consult with the panel while their plans are still at the drawing-board stage rather than have the local authority complain about a smoke nuisance after they have spent a good deal of money installing unsuitable plant. In this way we can work together, not only to make Smethwick a cleaner and healthier town, but also to increase fuel economy."

Glasgow Works Accident Award

Damages of £562 10s. have been awarded by a jury, sitting with Lord Migdale in the Court of Session, to D. B. McNiven, electrician, who was the pursuer in an action against his employers, Dixon's Iron Works, Limited, Crown Street, Glasgow, for payment of £1,250 in respect of personal injuries. On June 15, 1952, the pursuer had to detect and remedy a fault on the ram machine in the coke-oven department at the works. As he was engaged or about to start work at a terminal box he slipped or lost his balance and fell from an upper platform about 15 ft. high. He sustained rib and other injuries. McNiven blamed the defenders for the accident in having had the terminal box in such a position that it involved a dangerous manoeuvre to reach it. He also averred that the platform from which he fell ought to have been fenced with a handrail.

The defenders denied fault and said the pursuer placed himself unnecessarily in a position of danger. The jury assessed total damages at £750, but held the pursuer was 25 per cent. to blame.

BRISTOL TOOL & GAUGE COMPANY, LIMITED—Mr. E. G. Simmonds has been elected a director.

Book Review

Metals Reference Book (Vols. I and II) (second edition) by Colin J. Smithells, M.C., D.Sc., Published by Butterworths Scientific Publications, 88, Kingsway, London, W.C.2. Price £8 8s.; by post 2s. 6d. extra.

When the reviewer criticized the first edition of this book, which cost £3, he considered that the buyer was getting good value for money; that was in 1949. Now, for two volumes £8 8s. is asked, yet with increased printing costs, the price, though pretty stiff, is still, one may assume, reasonable. Much has been added—especially in the bibliographies, and several sections have been rewritten. Unfortunately, this does not apply to the foundry section, where for instance in Table II of this section the newer synthetic resins should have been included. There is no reference to such alloys as nodular cast iron. In Table VII a proprietory bonding clay is listed which is no longer on the market. There is still much need for revision in this section, but this does not necessarily apply to the whole of this huge work, of which foundry practice is but a small part—a matter of 32 pages out of about 1,000. The real value of a book of this type must lie in the response it gives when searching for data just removed from one's normal activities. Here the demand must have been met, otherwise there would have been no call for a second edition. For instance, the metallurgist may be suddenly called upon to utilize titanium and in this book he will at the minimum find the fundamental facts. There are well over 200 pages devoted to equilibrium diagrams, unquestionably a very valuable information. There is a large number of tables dealing with every phase of metallurgical knowledge. Except for adverse criticism of the foundry section, the reviewer has nothing but praise for this monumental work. V.C.F.

New Catalogues

High-duty Cast Iron. The International Meehanite Metal Company, Limited, Meerion House, 4, Downside, Epsom, Surrey, have just issued a brochure entitled "Meehanite in the Service of Industry." Quite adventitiously it does show the basic character of the foundry industry, as but few applications of grey-iron castings are omitted and these in general are of the type made for builders' merchants. No fewer than 27 quite different applications are cited, and amongst them are many where service conditions are particularly severe. The booklet runs to 44 pages and is splendidly illustrated, the pictures used emanating from a wide variety of sources.

The reviewer has only one slight criticism to make, and that is he would like the expression "pressure" castings to be expanded to the phrase "pressure-resisting" in order to align itself with heat- and corrosion-resisting alloys.

Illuminators for Industrial Radiography.—Kodak Limited, Kodak House, Kingsway, London, W.C.2, have just issued a 12-page illustrated catalogue, which details the potentialities of about half-a-dozen different types of apparatus designed to give the best set of conditions for viewing X-ray transparencies under different conditions. It is available to readers on writing to Kodak House.

ADDITIONS covering nearly 30,000 sq. ft. to the Aycliffe (Co. Durham) works of the E.N.V. Engineering Company, Limited, London, N.W.10, are proposed.

Rise in Labour Costs in Last Six Years

Increasing labour costs in this country are often quoted by the economic pundits as one of the main reasons why Britain's share of world trade is declining. But just how much these costs have risen in recent years is very difficult to assess. Thus the Treasury's *Bulletin for Industry* for August, which includes statistics on this more obscure facet of the nation's economy, may be excused for including an accompanying cautionary note pointing out that all the figures given are subject to wide and varying margins of error.

The figures are not so rough, however, that they falsify the general trends shown over a period or the relations between them. Between 1948 and 1954, it would appear, labour costs per unit of output in the UK economy as a whole rose by about 27 per cent. In the industries covered by the index of industrial production (mining and quarrying, manufacturing, building and contracting, and gas, electricity, and water) they rose by 21 per cent. The rise in mining and quarrying (predominantly coal mining) was around 30 per cent.; in manufacturing industry 20 per cent.; in building and contracting 32 per cent.; in electricity, gas, and water 15 per cent.

For the "service industries," transport and communications, covering both the railways and the roads, showed an increase of about 12 per cent., and distribution an increase of 40 per cent. Thus, transport and communications, and electricity, gas, and water had the smallest rises in labour costs over the period, and distribution and building and contracting the largest.

The *Bulletin* says that the increases between 1948 and 1954 were concentrated in the years 1950-52. Retail prices were forced up by the rise in import prices after the Korean war and wages rose in pursuit.

Steep Rise in Basic Material Prices

Prices both of basic materials used in industry and of manufactured products rose more in the first seven months of this year than in any comparable period since they reached their peak levels in March, 1951, and March, 1952, respectively. The Board of Trade's index measuring changes in the overall level of prices of basic materials excluding fuel (June 30, 1949 = 100) rose by 7.3 points to 153.7 between December and July.

The rise was mainly due to higher prices for copper (up 15.6 per cent.), rubber (up 22 per cent.), and other commodities. Tungsten-ore prices showed a rise of 25.3 per cent. during the period.

The basic materials index showed a further rise of 2 per cent. during July, mainly due to increased prices for raw rubber, coal for carbonizing, aluminium ingots, copper, tin, lead, and tungsten ore.

SINCE ITS INCEPTION at the end of 1950, 80 scholarships have been awarded, 64 scholars have arrived in this country, and 23 have completed training and returned home, says the annual report for the year to March 31, 1955, of the overseas scholarship scheme of the Federation of British Industries, which provides practical training in Britain for selected graduate engineers from developing countries overseas. Six more have arrived since the date of the report. In 1956, 107 scholarships are being offered and it is hoped that eventually it will be possible to increase the number to 150 each year.

News in Brief

L. GARDNER & SONS, LIMITED, have had plans drawn up for the erection of an iron foundry on the north side of Barton Hall Engine Works, Eccles, Lancs.

THE FIRM OF H. MATTHEWS & COMPANY, Greengate Works, Keighley, Yorks, has become a limited company under the name of H. Matthews (Castings), Limited.

WORKINGTON IRON & STEEL COMPANY are planning the construction of a new training centre at Moss Bay, Workington, Cumberland, at an estimated cost of £35,000.

MISS PAT HORNSBY-SMITH, Parliamentary Secretary at the Ministry of Health, opened a medical centre at the Appleby-Frodingham Steel Works at Scunthorpe on August 16.

NORTH FOUNDRIES, LIMITED, Anfield Works, Audenshaw, Manchester, have had plans approved for the erection of extensions to the foundry at Lansdowne Road, Eccles, Lancs.

BRITISH INSULATED CALLENDER'S CABLES, LIMITED, announce the appointment of Mr. E. Watt as their branch manager in Chester. The appointment takes effect from September 1.

PLANS HAVE BEEN APPROVED for office and foundry additions for Clarke, Chapman & Company, Limited, manufacturing marine and electrical engineers, boilermakers, etc., of Gateshead.

THE AMALGAMATED UNION OF FOUNDRY WORKERS, division 6, announce that they have changed their address to 60, Tottenham Court Road, London, W.1. The new telephone number is Museum 1303.

A NEW FACTORY is to be built by the British Oxygen Company, Limited, on a 16-acre site at the junction of Warren Lane and Winterton Road, Scunthorpe (Lincs), which will supply oxygen through pipelines to three of the town's large steelworks.

GROUND NUT-SHELLS, oak sawdust and the like is now being considered suitable for blasting the surfaces of components to be freed from paint, oil or grease, when conditions are such that shot-blasting is too fierce or chemical treatment is undesirable.

THE PROCEEDINGS of the conference on the organization of applied research in Europe, held at Nancy last October, have been published by the Organization for European Economic Co-operation. Copies are obtainable from the Stationery Office (12s.).

A CONTRACT for electric plant at the Juja Road substation, Kenya, has been received by the British Thomson-Houston Company, Limited. The sub-station has been designed in conjunction with the BTH hydro-electric plant for the Owen Falls generating station.

A GERMAN salvage vessel and a small tender have commenced breaking up operations to recover scrap from three British cruisers—the Hague, Cressy, and Aboukir—which were sunk by the submarine U9 on September 22, 1914, about 23 miles off the Hook of Holland.

AT THE Society of British Aircraft Constructors' Exhibition, Farnborough, September 5 to 11, the Dunlop Rubber Company's stand is to include displays by the company's aviation division, Dunlop Special Products, Limited, and Xetal Products, Limited (a Dunlop subsidiary).

A PARTY of Norwegian iron-ore miners, who have been studying trade unionism at Wortley Hall, Stocksbridge, Sheffield, were given a civic reception at Sheffield Town Hall, after which they visited the Rotherham works of the Park Gate Iron & Steel Company, Limited. Here they saw iron ore from Norway being made into steel.

RAPID MAGNETIC MACHINES, LIMITED, Birmingham, announce that they have been sole licensees for Crockett heavy media magnetic separators for many years, and that they co-operate with Dings of USA in this field. They intimate that they have no connection with any other concern purporting to manufacture "Crockett-type" separators.

ITALIAN STEEL OUTPUT this year is likely to reach 5,000,000 tons. During the first seven months of the year production, at 3,100,000 tons, was 31.5 per cent. above the level of the corresponding period of last year. Pig-iron output in the first seven months of this year was 946,570 tons, compared with 728,652 tons in the January-July period of last year.

CHARLES ROBERTS & COMPANY, LIMITED, carriage and wagon builders, Horbury, near Wakefield, have entered their centenary year. The business was founded in 1856. The carriage building shops are being extended and there are orders on hand to the value of £6,000,000. The first quarter's output of the current year has exceeded that of the corresponding period of last year.

THE NEW EXTENSION to the British Railways research department at Derby will include the erection of a new engineering laboratory. This will permit the installation of unusually heavy equipment for fatigue testing, etc., of large units such as frames, bridge members, assemblies and other components. Additional workshop facilities will be part of the planned extension.

YORK CARRIAGE AND WAGON WORKS will be visited by the Duke of Edinburgh on November 1, when he goes to the city to unveil a memorial to airmen in the Minster. The memorial is in the form of an astronomical clock and commemorates 18,000 officers and men who were killed or reported missing while operating from RAF stations in the North of England.

THE DONALD L. MORAN PRIZE for the best paper on management (factory and distribution) in the final examination of the Institute of Cost and Works Accountants has been awarded to Mr. ERNEST WADE, a cost clerk with Thos. Allen & Sons, Limited, iron-founders, of Bonlea Foundry, Thornaby-on-Tees. There were 1,108 candidates for the whole or part of the final examination, of whom 200 passed the complete examination.

THE WORLD BANK has made a loan of $12,000,000 in various currencies to the State Railway of Thailand. It will help to finance the renewal of rails on 875 miles of track; the purchase of 30 diesel locomotives, 170 passenger coaches and about 850 freight cars; the installation of 5,800 automatic couplers, and an up-to-date telecommunications system. In addition, bridges and buildings will be constructed, yards remodelled, and sidings extended.

GEO. SALTER & COMPANY, LIMITED, will be early in the commercial television field. During the first week of operation of Associated Rediffusion's transmissions covering the London and Home Counties area, the Salter No. 59 domestic balance will be introduced by Margot Lovell—well known to BBC television viewers—in the first of a series "Pounds, Shillings and Sense." This particular programme will be transmitted during the morning of September 29.

CLOSELY FOLLOWING on the recent announcement of new production developments which made it possible

News in Brief

to produce cooled-blade sections in the Nimonic alloys, Henry Wiggin & Company, Limited, have now released preliminary information on a new alloy in the series, known as Nimonic 100, which has very high resistance to creep but may be used at temperatures some 30 deg. C. higher than those permissible for previous alloys in the series.

MARTIN, BLACK (WIRE ROPES), LIMITED, Coatbridge, are now supplying wire for use in Japanese shipyards at Kure. Orders for the wire were placed through the Coatbridge firm's New York distributors and payment is being made in dollars. Shipments are being sent direct from Glasgow and Middlesbrough to Kobe and transshipped from there to Kure. It is a two-way trade for Japanese wire rods are at present being shipped to this country for manufacture into steel wire for ropes.

PLANS FOR THE TRANSFER of the Premier Aluminium Casting Company, Limited, one of the subsidiaries of the Barton & Sons, Limited, group, from Birmingham to Walsall are now almost completed. By the end of January next, the firm will be occupying its new £50,000 premises at Birchills, the actual transfer beginning in September. The labour force will be considerably increased. Founded in 1910, the Premier Aluminium concern manufactures die-castings for many trades.

ALEX. STEPHEN & SONS, LIMITED, Glasgow, have received an order from Elders & Fyffes, Limited, for three ships to carry bananas from the West Indies and the British Cameroons. Each ship will be of 6,000 tons gross, have accommodation for 12 passengers, a speed of 18 knots and a cargo capacity of 1,650 tons of bananas. The value of the contract has been placed at about £3 million. The vessels are due for delivery in 1957, when they will join the other 15 ships of the Fyffes Line fleet.

FOLLOWING THE SUCCESS of the "Seraphim" blast-furnace plant at the Scunthorpe (Lincs) works of the Appleby-Frodingham Steel Company (branch of the United Steel Companies, Limited), which for 18 months has been fed entirely on home-produced ore, the Iron and Steel Board has approved the building of another big turbo-blower. Site clearance began this week. It is claimed that the new turbo-blower, which will be completed in about 18 months' time, will be the largest of its kind in the world.

A CONTRACT worth $500,000 to supply rolling-stock wheels for Canadian National Railways has been awarded to John Baker & Bessemer, Limited, Rotherham, the Steel, Peech & Tozer branch of the United Steel Companies, Limited, and Taylor Bros. & Company, Limited, a subsidiary of the English Steel Corporation, Limited. The order, which was won against competition from North American companies, is for 4,480 wheels ranging from 36-in. passenger-car wheels to 42-in. diesel locomotive wheels.

STEEL COMPANY OF WALES have placed a repeat order for six 300-h.p. 0-4-0 diesel-electric shunting locomotives with the Brush Bagnall Traction, Limited, Loughborough. The traction motors control gear and main generators will be manufactured by Brush Electrical Engineering Company, Limited, Loughborough. The mechanical parts will be made by W. G. Bagnall, Limited, and the six-cylinder pressure-charged M4AAU6 engines will be manufactured by the National Gas & Oil Engine Company, Limited, of Ashton-under-Lyne.

CHANGED RESPONSIBILITY.—From August 22 the following commodities are being dealt with by the Board of Trade instead of by the Ministry of Agriculture, Fisheries and Food, as at present (*i.e.*, the Board of Trade will become the "production department" for these commodities):—(1) Linseed and linseed oil (these were included under the heading "drying oils" in the Directory of Production Departments and Commodities published in the *Board of Trade Journal* of October 9, 1954); (2) miscellaneous vegetable seeds and oils (including niger, perilla, poppy, rubber and safflower); and (3) sperm oil.

GRIFFIN & GEORGE, LIMITED, Ealing Road, Alperton, Wembley, Middlesex, the laboratory furnishers, manufacturers of laboratory furniture in wood, who have recently entered into an arrangement with Grundy Equipment, Limited, for the fabrication of metal unit furniture, announce that contracts have been awarded them from Birmingham Colleges of Technology (City of Birmingham Education Committee); Newcastle General Hospital (John Laing & Sons, Limited; Northern Hospital Board); Glaxo, Limited; and Croydon Technical College (Robert Atkinson & Partners), to a total of about £76,000.

LANCASHIRE DYNAMO HOLDINGS, LIMITED, announces the formation of a new company in Australia—Lancashire Dynamo Coates Pty., Limited, a development which follows nearly 30 years' representation of Lancashire Dynamo companies in Australia by Coates & Company Pty., Limited. The new company will handle all inquiries in Victoria, South Australia, and Tasmania from its head office in Melbourne; a branch office will cover New South Wales. Representation in Queensland will be by Coates & Company Pty., Limited; in Western Australia, Harris Scarfe & Sandovers, Limited, will continue to represent the group and will act as agents for Lancashire Dynamo Coates Pty., Limited, in connection with Australian-made equipment.

ORGANIZED by the metal physics committee of the Institute of Metals, a one-day symposium on "Mechanism of Phase Transformations in Metals" will be held at the Royal Institution, Albemarle Street, London, W.1, on November 9, beginning at 10 a.m. Eighteen papers (mainly describing original work) have been contributed. The morning session will be devoted to transformations of the nucleation and growth type, while the subject for discussion at the afternoon session will be martensitic transformations. Non-members of the Institute will be welcome at the meeting, detailed particulars and a registration form in connection with which may be obtained from the secretary, Lieut.-Colonel S. C. Guillan, T.D., 4, Grosvenor Gardons, London, S.W.1.

IN JANUARY, the City and Guilds of London Institute published the detailed syllabuses in a 16-page booklet, known as "Plant Engineering Brochure 187," and distributed copies to technical colleges throughout Britain. Five selected colleges in Birkenhead, Birmingham, Blackburn, Dartford, and Hatfield are to organize both part-time and evening classes covering this syllabus. Candidates will normally be those who have already reached the ordinary national certificate standard in engineering, although some other students may be allowed to attend under certain conditions. The course will particularly appeal to those who are attracted to (and perhaps more suitable for) the wider field of installation and operation of plant as opposed to the narrower one of plant design and construction, and might well include students who feel anxious over the academic nature of the higher national certificate course.

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Personal

Mr. A. R. FORD, works manager of Vowles Aluminium Foundry Company, Limited, West Bromwich, has been appointed works director.

Major C. J. P. BALL, D.S.O., M.C., F.R.Ae.S., chairman of Magnesium Elecktron, Limited, Manchester, has been nominated president of the Institute of Metals

Mr. JOHN STEELE, past-president of the South African branch of the Institute of British Foundrymen is joining the staff of Foundry Services S.A., Limited, on September 1.

Mr. W. H. MORRISON has been appointed electrical engineer of the Carron Company, ironmasters, etc., of Falkirk (Stirlingshire), in succession to the late Mr. James Comrie.

SIR GEORGE BINNEY, export director of the United Steel Companies, Limited, left on August 20 for Australia, where he will attend the opening of a large new steelworks.

FOUR EMPLOYEES of Aiton & Company, Limited, pipe engineers, of Derby, were presented with awards for 25 years' service by Wing-Commander J. M. AITON, chairman and managing director.

Mr. R. W. MCCRONE, who retired from the board of Metal Industries, Limited, Glasgow, last May, and Mr. S. J. L. HARDIE, have been proposed by the directors of the company as hon. presidents.

Dr. DAVID GORDON TUCKER has been appointed Professor of Electrical Engineering from September 1 at Birmingham University. He succeeds Professor ARNOLD TUSTIN who was appointed in 1947 and is taking up a similar post at Imperial College, London.

Mr. R. J. BROWN, F.I.M., has been appointed materials engineer for the British Motor Corporation at Longbridge, Birmingham. He joined Morris Motors in 1929 as a chemist and became chief chemist and metallurgist in 1935; he took control of the Nuffield Central Research Laboratories on their establishment in 1945.

Mr. A. WHITFIELD, production manager of Widnes Foundry & Engineering Company, Limited, and Mr. H. L. SANDERS, chief draughtsman and designer, have been appointed to the board. Mr. Whitfield has been with the company, which is a subsidiary of Thos. W. Ward, Limited, for 17 years, and Mr. Sanders for 18 years.

Mr. THOMAS G. ELLISON has been elected chairman of George Ellison, Limited, engineers and switchgear manufacturers, of Perry Bar, Birmingham, Tufnol, Limited, manufacturers of electrical insulating materials, of Perry Bar, and Alfred Ellison, Limited, ironfounders, of West Bromwich. He had previously served as a director of the three companies.

Mr. W. PLUMB has been appointed deputy commercial manager of the Liverpool and Netherton works of the English Electric Company, Limited. For the last six years Mr. Plumb has been manager of the Leeds branch office of the company; he is succeeded there by Mr. A. J. EVANS, who has been at the London branch following a period in charge of the Tonbridge office.

FOR THE PAST EIGHT YEARS comptroller of the Canadian division of the Yale and Towne Manufacturing Company, Mr. JOHN O. SEWELL has now taken up the post of comptroller to the British divisions of the company at Willenhall and Wednesfield, Staffs. Mr. BERTRAM A. SHORTMAN has been appointed budget manager of the British divisions. He has been with the company for 29 years.

The appointment of Mr. ANTHONY CAWLEY as assistant electrical engineer is announced by Newton, Chambers & Company, Limited, Thorncliffe, near Sheffield. In 1952 he was appointed an assistant engineer in the company's electrical engineer's department, and just over a year ago he accepted an appointment with Shepcote Lane Rolling Mills, Limited, Tinsley, Sheffield. Mr. Cawley is 28.

Mr. J. E. P. DUNNING has been promoted to deputy chief scientific officer, Ministry of Supply, and appointed director of engine research and development II. Mr. R. O. FREEMAN has been promoted to director (engineer) and appointed director of guided weapons production. Mr. R. J. LEES has been promoted to deputy chief scientific officer and appointed director of scientific research, guided weapons.

Mr. E. WATT has been appointed branch manager for British Insulated Callender's Cables, Limited, in Chester, as from September 1. Mr. Watt joined British Insulated Cables, Limited, in 1917, being attached to the Manchester branch sales staff. His sales territory included the North Wales area and he was closely identified with the initial electrification of many collieries in the North Wales coalfield.

SERVICE ABROAD will be no new experience for Mr. E. C. Whiteley, who has been appointed manager of the Middle East division of the Metropolitan-Vickers Electrical Export Company, Limited. In 1930 he was appointed as the company's technical representative in Malaya, being stationed at Singapore, and during the next 12 years he travelled extensively in the Far East. He then spent three years in Australia as works engineer and acting manager of the Australian General Electric Company's works at Richmond, Melbourne. On his return to England in 1945 Mr. Whiteley was assigned to duties in connection with Metropolitan-Vickers' wide interests in the petroleum industry. Since 1949 he has been the company's special representative in connection with the petroleum industry, responsibility which he will retain in conjunction with this appointment as manager of the Middle East division.

Obituary

Mr. FRED FISHER DOCKING, founder of F. F. Docking, & Company, heating engineers, of Uttoxeter New Road, Derby, has died at the age of 81.

Mr. CHARLES FREDERICK ABELL, senior partner in the firm of William Abell, general engineers, of Brook Street, Derby, has died at the age of 79.

Mr. DAVID PERSTON, who joined the North British Steel Foundry, Limited, Bathgate, about nine months ago as machine-shop manager, died suddenly while on holiday in Italy recently.

Mr. THOMAS LAWRIE, who had been general manager of the North of Scotland Hydro-Electric Board since 1948 and was its first secretary, died recently at the age of 54. After graduating at Cambridge he spent three years in the hydro-electric section of the English Electric Company, Limited, at Stafford before becoming secretary of the Power & Traction Finance Company, Limited, which promoted electrification schemes in many parts of the world. Mr. Lawrie held other appointments before serving in the Royal Navy during the second world war. He was released from the Service at the end of 1943 on the formation of the North of Scotland Hydro-Electric Board.

FIRST WITH W20

BEETLE RESIN* W42

This new synthetic resin core-binder has been specially developed to suit those foundries where fumes and casting odours cause embarrassment. The result of practical co-operation between B.I.P. and leading foundries, Beetle W42 is another example of B.I.P.'s pioneer research and service to the Foundry Industry. W42 has been formulated with the Garrett Report in mind and it possesses all the advantages of Beetle Resin W20, coupled with this important new feature . . .

reduced casting odour

* *Patent Application 32896/58*

B·I·P

Write for technical information to B.I.P. Chemicals Limited, Tat Bank House, Oldbury, Nr. Birmingham

London Office: 1 Argyll Street, W.1. *'Beetle' is a trade mark registered in Great Britain and in most countries of the world.*

Raw Material Markets

Iron and Steel

Operations at the foundries are in full swing once more, and as most of the trades to which they supply castings have also completed their holidays, demands are at a high level. Apart from some of the light foundries, order-books are full and sufficient business is on hand to ensure high outputs. Many foundries, however, are impeded in their operations by the shortage of raw materials and to a lesser extent by the scarcity of suitable labour.

The motor, speciality, and heavy engineering foundries are heavily engaged. All the pig-irons they use are scarce, low- and medium-phosphorus irons and hematite particularly so. Outputs have for a long time been below demands, and with the present pressure for castings, the difficulties of obtaining adequate supplies have increased proportionately. There appears to be no solution to the problem until larger productive capacity is available. Hematite deliveries have certainly improved recently, but not to the extent needed to make good the shortage of the low- and medium-phosphorus irons.

In order to keep plant as fully employed as possible, there is a much increased demand for the refined irons, while some of the foundries have bought parcels of imported iron. Many more inquiries are being received for supplies of imported low-phosphorus irons and hematite, but suitable parcels are scarce and prices are high.

The supply of high-phosphorus pig-iron for the light and jobbing foundries appears to be sufficient to meet current needs, but there is little to spare.

Producing furnaces maintain outputs at good levels and are able to distribute available supplies readily. Basic steelmaking pig-iron comprises at least 75 per cent. of total outputs, but even this quantity is inadequate to meet all requirements and has to be augmented with imported irons.

There is still a heavy demand from the foundries for heavy cast-iron and machinery scrap, and it is accentuated by the scarcity of some grades of pig-iron. Foundry coke is coming forward in regular consignments.

The steel mills are uniformly busy and there is a waiting list of orders for all products.

Non-ferrous Metals

Copper took a fresh upward leap last week to reach new record price levels. On Wednesday's midday market there was an advance of £11 in the cash price to £373, three months advancing to £357. On the following day £3 was added to the cash price and £5 to the forward quotation, while at Friday midday cash stood at £379 with a £13 backwardation for three months. In the afternoon cash was priced at £380 and three months at £367 10s., these quotations showing a gain of £18 in cash and of £13 10s. in three months. The news from the United States that Anaconda had advanced its selling price to 40 cents per pound was a signal for other major producers to follow suit. The increase had been expected for a long time and the announcement did not occasion any surprise in metal circles, but, coupled with the shortage of copper, the London market has been influenced.

After a slight fall earlier this week, the settlement price on the London Metal Exchange yesterday (Wednesday) stood at £381.

In tin the backwardation narrowed and cash closed £2 up with three months £3 10s. better. It has now been suggested that the operation of the tin scheme may be deferred until next April. Zinc gained 15s. prompt and 10s. forward, while lead was 30s. better for both positions.

Figures for June issued by the British Bureau of Non-Ferrous Metal Statistics show that consumption of copper in the month advanced by about 5,600 tons to 60,067 tons. Stocks went up from 58,546 tons to 64,256 tons. In zinc stocks were reduced, comparative figures being 48,227 tons at June 30 and 50,447 tons at the end of May. Consumption improved from 29,237 tons, all grades, in May to 31,467 tons in June. Lead stocks fell sharply from 38,760 tons at May 31 to 30,816 tons at June 30. Consumption of refined lead and scrap in May was 31,092 tons, while in June it moved up to 32,627 tons. Tin usage in June was 1,997 tons, an advance of 157 tons.

Official metal prices were as follow:—

COPPER, Standard—*Cash*: August 18, £374 to £376; August 19, £378 to £379; August 22, £374 10s. to £375; August 23, £377 10s. to £378; August 24, £380 to £381.

Three Months: August 18, £361 to £362; August 19, £365 to £366; August 22, £367 to £368; August 23, £370 to £370 10s.; August 24, £372 to £372 10s.

TIN, Standard—*Cash*: August 18, £751 to £752; August 19, £749 10s. to £750; August 22, £748 to £749; August 23, £749 to £751; August 24, £750 to £751.

Three Months: August 18, £748 to £749; August 19, £747 to £747 10s.; August 22, £746 to £747; August 23, £747 to £748; August 24, £749 to £749 10s.

LEAD—*Second half August*: August 18, £106 5s. to £106 10s.; August 19, £106 15s. to £107; August 22, £106 5s. to £106 10s.; August 23, £106 10s. to £106 15s.; August 24, £107 to £107 5s.

Second half November: August 18, £105 15s. to £106; August 19, £106 to £106 10s.; August 22, £105 15s. to £106; August 23, £105 15s. to £106; August 24, £106 to £106 5s.

ZINC—*Second half August*: August 18, £89 to £89 5s.; August 19, £89 10s. to £89 15s.; August 22, £89 5s. to £89 10s.; August 23, £89 10s. to £89 15s.; August 24, £89 15s. to £90.

Second half November: August 18, £89 to £89 5s.; August 19, £89 10s. to £89 15s.; August 22, £89 5s. to £89 10s.; August 23, £89 10s. to £89 15s.; August 24, £89 12s. 6d. to £89 15s.

Coking Coal Find near Glasgow

Depending on the results of three new borings, the Scottish Divisional Coal Board will decide by the end of this year whether or not to sink a new colliery at Bearsden, near Glasgow. Initial borings to 50 and 75 fms. have been encouraging, showing that coking coal of particular value exists in seams approximately 4 ft. thick.

At a preview of the Scottish Coalfields Exhibition in the Royal Technical College, Glasgow, Mr. D. Lang, general manager of the Central West Area of the Scottish Division, said that if it was decided to mine coal in the area, sinking operations would start in about two or three years. The period of working would be anything from 10 to 20 years. Pithead buildings would be in the open country.

CARRIER ENGINEERING COMPANY, LIMITED—Mr. L. E. Geering and Mr. A. W. Putnam have been appointed directors.

WELLMAN SMITH OWEN ENGINEERING CORPORATION, LIMITED—Mr. Philip E. Holloway has been appointed to the board.

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FS 14

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

August 24, 1955

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £17 1s. 0d.; Birmingham, £16 13s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £18 12s. 9d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £19 8s. 3d.

Scotch Iron.—No. 3 foundry, £19 5s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £21 3s. 0d.; South Zone, £21 5s. 0d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £22 0s. 0d.; South Zone, £22 3s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. of England (local iron), £19 5s.; Scotland (Scotch iron), £19 11s. 6d.; Sheffield, £20 12s. 0d.; Birmingham, £20 19s. 6d.; Wales (Welsh iron), £19 11s. 6d.

Basic Pig-iron.—£16 16s. 6d. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £40 15s. 0d., scale 15s. per unit; 75 per cent. Si, £63 0s. 0d., scale 16s. per unit.

Ferro-vanadium.—50/60 per cent., 23s. 8d. to 25s. 0d. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 11s. 0d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £230 0s. 0d.; 38/40 per cent., £279 0s. 0d.

Ferro-tungsten.—80/85 per cent., 17s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 20s. 6d. per lb. of W.

Ferro-chrome (6-10 ton lots).—4/6 per cent. C, £83 0s. 0d. to £86 0s. 0d., basis 60 per cent. Cr, scale 25s. 0d. per unit; over 6 per cent. C, £81 0s. 0d. to £84 0s. 0d., basis 60 per cent. Cr, scale 24s. 0d. per unit; 2 per cent. C,* 1s. 11½d. per lb. Cr; 1 per cent. C,* 2s. 0d. per lb. Cr; 0.15 per cent. C,* 1s. 11d. to 2s. 1d. per lb. Cr; 0.10 per cent. C,* 1s. 11d. to 2s. 2d. per lb. Cr; 0.06 per cent. C,* 2s. 3d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 7s. 0d. to 7s. 6d. per lb.

Metallic Manganese.—93/95 per cent., carbon-free, £249 0s. 0d.; 96/98 per cent., £269 0s. 0d.

Ferro-columbium.—60/75 per cent., Nb + Ta, 37s. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £53 17s. 6d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £26 19s. 0d.; tested, 0.08 to 0.25 per cent. C, £27 19s. 0d.; hard (0.41 to 0.60 per cent. C), £29 5s. 6d.; silico-manganese, £36 7s. 6d.; free-cutting, £31 0s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £34 12s. 0d.; silico-manganese, £36 7s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £31 11s. 0d.; basic, hard, over 0.41 up to 0.60 per cent., C, £32 13s. 6d.; acid, up to 0.25 per cent. C, £35 12s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £33 1s. 6d.; boiler plates (N.-E. Coast), £35 11s. 6d.; floor plates (N.-E. Coast), £34 10s. 6d.; sectional material, N.-E. Coast, £30 19s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £33 19s. 6d.; flats, 5 in. wide and under, £33 19s. 6d.; hoop and strip, £35 1s. 6d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £36 5s. 0d.; black sheets (hand mill), 17/20 g., £46 13s. 6d.; galvanized corrugated sheets, 24 g., £54 14s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £58 0s. 3d.; nickel-chrome, £81 10s. 0d.; nickel-chrome-molybdenum, £92 7s. 6d.

NON-FERROUS METALS

Copper.—Cash, £380 0s. 0d. to £381 0s. 0d.; three months, £372 0s. 0d. to £372 10s. 0d.; settlement, £381 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 3s. 6¾d. per lb.; rods, 418s. 3d. per cwt. basis; 20 s.w.g., 451s. 6d. per cwt.

Tin.—Cash, £750 0s. 0d. to £751 0s. 0d.; three months, £749 0s. 0d. to £749 10s. 0d.; settlement, £751 0s. 0d.

Lead (Refined Pig).—First half August, £107 0s. 0d. to £107 5s. 0d.; first half November, £106 0s. 0d. to £106 5s. 0d.

Zinc.—First half August, £89 15s. 0d. to £90 0s. 0d.; first half November, £89 12s. 6d. to £89 15s. 0d.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £120 15s. 0d.; rolled zinc (boiler plates), all English destinations, £118 10s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £103 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 9¾d. per lb.; rods, drawn, 3s. 7¼d.; sheets to 10 w.g., 346s. 3d. per cwt.; wire, 3s. 4¾d.; rolled metal, 346s. 3d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £227; B6 (85/15), —; BS249, —

Brass (High Tensile).—BS1400, HTB1 (30 tons), £284; HTB2 (38 tons),—; HTB3 (48 tons), £315.

Gunmetal.—RCH, 3/4 per cent. tin, —; BS1400, LG2 (85/5/5/5), £316; LG3 (86/7/5/2), £327; G1 (88/10/2/), £395; (88/10/2/1), £377.

Phosphor Bronze.—BS1400, PB1 (AID released), £414 per ton.

Phosphor Bronze Strip, etc.—Strip, 507s. 0d. per cwt.; sheets to 10 w.g., 530s. 6d. per cwt.; wire, 5s. 1¼d. per lb.; rods, 4s. 5¾d.; tubes, 4s. 4d.; chill cast bars: solids 4s. 6d. cored 4s. 7d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 4s. 4d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 8¼d.; special quality turning rod, 10 per cent.; ½ in. dia., in straight lengths, 4s. 7½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 4d. per lb. Antimony, English, 99 per cent., £210 0s. 0d. Quicksilver, ex-warehouse, £90 0s. 0d. to £95 0s. 0d. Nickel, £519 0s. 0d. Aluminium, ingots, £171 0s. 0d.; aluminium bronze (BS1400), AB1, £356; AB2, £365. Solder, brazing, BS1845, 2s. 11d. lb.; granulated, 3s. 3d. lb.

* Average 68-70 per cent.

New Patents

(Copies of complete specifications are obtainable from the Patent Office Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3/-.)

734,348. J. B. Brennan, 13018 Lake Shore Boulevard, Cleveland, 8, Ohio, USA.

The continuous casting of metal by discharging molten metal centrifugally and in successive metered amounts into a die. The metal in the die is then cooled and withdrawn at a volumetric rate equal to the volumetric rate of introduction of the molten metal to the die.

734,607. Shaw Processes, Limited, 14, Gray Street, Newcastle-upon-Tyne.

An improvement in shell moulding which consists of mounting a mould plate in a frame which is heated. The shell forming material is deposited on the plate, cured, and the finished mould ejected. The mould plate is retained in the frame throughout the whole operation and the heating unit and container are brought into operation with the frame one after the other.

734,837. J. B. Brennan, 13018 Lake Shore Boulevard, Cleveland, 8, Ohio, USA.

A method of casting molten metal. At least one of a number of parts of a mould-cavity former which extends into a molten-metal reservoir, is moved through the reservoir. The metal flows into the mould cavity and passes out of the reservoir with the movable parts through a zone in which the metal solidifies.

734,892. Buderus'sche Eisenwerke, 52 to 56 Sophienstrasse, Wetzlar, Germany.

This relates to a casting installation using roller-type conveyors for the transportation of the moulding boxes. The advantages of the invention which also consists of devices for moulding, casting, and emptying the boxes, are achieved by mechanizing the separate steps as far as possible and making the separate working stations independent of one another.

734,953. Allis Chalmers Manufacturing Company, Milwaukee, Wisconsin, USA.

A process for obtaining from a molten ferrous metal containing graphite-yielding carbon, spheroidal-graphite cast iron. Molten cast iron, at least one halide of a spherular-graphite inducing agent, and a reducing agent are brought together, melted, and solidified, whereupon the halide element is effective in inducing the spheroidal graphite. The patent also gives details of the use of chloride, bromide, iodide, or fluoride inducing elements selected from the group lithium sodium, magnesium, barium strontium and rubidium and cerium.

734,984. Commonwealth Engineering Company, 1771 Springfield Street, Dayton, Ohio, USA.

A method for the successive continuous casting and plating of metal. The metal is brought into contact with metal bearing, heat-decomposable gas while the metal is at the decomposition temperature of the gas. In more detail, the molten metal is poured into a mould, continuously withdrawn as hot congealed metal. While at or about the gas decomposition temperature, it is passed through a plating chamber which is kept supplied with the metal bearing gas.

CARLISLE CORPORATION has approved plans by the Metal Box Company, Limited, for the construction of a new factory at Carlisle.

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CLASSIFIED ADVERTISEMENTS

PREPAID RATES: Twenty words for 5s. (minimum charge) and 2d. per word thereafter. Box Numbers 2s. extra (including postage of replies).

Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House, 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Tuesday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

HEAD FOREMAN. Skilled moulder, knowledge in all classes of foundry practice. Accustomed to full control. Experienced in floor, bench, plate, and machine moulding. Training of unskilled labour.—Box HF447, FOUNDRY TRADE JOURNAL.

PATTERNMAKER (aged 34), with 18 years' experience of general engineering patternmaking, foundry and surface table work, seeks position in West Riding of Yorkshire as liaison officer or similar suitable post.—Box PA446, FOUNDRY TRADE JOURNAL.

EXECUTIVE requires position as MANAGER in Iron Foundry, with a view to expanding it on a commission/salary basis. Age 38, M.I.B.F. Car available. Any part of country. Replies treated with strictest confidence. Box ER451, FOUNDRY TRADE JOURNAL.

FOUNDRY EXECUTIVE, age 46, seeks position with progressive company. Experience, Grey Iron and non-ferrous. Loose pattern and mechanised production. Accustomed to full control. Representation considered. Box FE452, FOUNDRY TRADE JOURNAL.

YOUNG PATTERNMAKER, thoroughly experienced shell and loam methods manufacture of all types special pipework, seeks progressive situation in work of this nature. Box YP453, FOUNDRY TRADE JOURNAL.

FOUNDRY EXECUTIVE, 27; Public School and Engineering College education; conscientious and energetic with good foundry and general engineering experience, seeks a position of responsibility on either the sales or executive staff of a progressive company, who can offer sound future prospects. FE434, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

METALLURGICAL CHEMIST, aged under 30 years, required to take charge of laboratory and technical control in foundry producing 30 tons of white heart malleable and grey iron per week. This post offers excellent opportunities to a young man who wishes to acquire further training and experience.

Applications stating age, experience, and salary required to: BAGSHAWE & Co. LTD., Dunstable, Beds.

THOROUGHLY experienced METALLURGIST required to take complete charge of metal melting and analysis in iron foundry producing castings to varied specifications.

ROBERT CORT & SON LTD., Reading Bridge, Reading.

SITUATIONS VACANT—*contd.*

EXECUTIVES wanted. Dohm Group of 14 factories welcome applications from forceful personalities who create activity. Pulverising, surface treatment, ceramic and refractory raw materials, including vermiculite, graphite, zircon, silica. Large exporters of metals, plastic pipes, recoverers of plastic waste. Makers of "Dohmfrac" the most economical plastic used for shell moulding. Write to me personally, S. A. DOHM, 167, Victoria Street, London, S.W.1.

BRASS Gravity Die Casting TECHNICIAN required for a growing Foundry specialising in the production of Plumbers' Brass-ware. Applicant must have a complete knowledge of this branch of the foundry trade and be capable of organising and maintaining a high rate of production. This is a position for a very energetic and determined personality. Age not exceeding 40. Salary in accordance with experience. Contributory pension scheme. Southern area.—Box BG326, FOUNDRY TRADE JOURNAL.

EXPERT DESIGNER accustomed to Machinery automation work, who can take complete control of department, and possessing progressive ideas, needed for company in South Midlands. Good salary and excellent prospects for right man. Apply stating age and experience to Box ED424, FOUNDRY TRADE JOURNAL.

PATTERNMAKERS used to first class Wood and Metal work required by Coventry firm of Master Patternmakers. Top wages and excellent conditions. Box PU442, FOUNDRY TRADE JOURNAL.

FOREMAN IRONMOULDER required for General Jobbing Foundry near London. Must be experienced in all phases of jobbing work and cupola practice, and must also be capable of maintaining good labour relations. Previous experience desirable. Good house to successful applicant. Age not under 35 years. State terms. Box FI444, FOUNDRY TRADE JOURNAL.

SENIOR FOUNDRY FOREMAN required for progressive grey iron foundry, South Yorkshire Area. Sound experience chief requirement, and ability to control floor moulders. Prospects of advancement. Write stating age, experience and salary required to Box SF440, FOUNDRY TRADE JOURNAL.

DRAUGHTSMEN. — Applications are invited from Senior and Junior Draughtsmen to fill positions which have resulted from our expanding commitments. The work would involve the design and detailing of welded fabrications, pipework and light steel structures in connection with major installations. Excellent prospects of subsequent promotion exist for persons having initiative and an ability to accept responsibility.—Candidates should apply in writing to W. C. HOLMES & Co., LTD., Huddersfield, giving full details of previous experience, etc.

SITUATIONS VACANT—*contd.*

STEEL FOUNDRY SALES REPRESENTATIVE required by small steel foundry in Sheffield, capable of estimating weights from drawings, pricing the castings and subsequently visiting customers. The position would be partly inside and partly outside work, with a view to ultimately taking full responsibility as Sales Manager. Previous steel foundry experience is essential and applicants should be preferably between the age of 30 and 35 years. Replies giving details of experience, salary expected, etc., will be treated in the strictest confidence, to Box SF433, FOUNDRY TRADE JOURNAL.

BRITISH STEEL CASTINGS RESEARCH ASSOCIATION.

APPLICATIONS are invited from GRADUATES with some research experience to work under the direction of Dr. T. P. Hoar in the Department of Metallurgy at Cambridge University, on problems relating to steel castings. For this work the British Steel Castings Research Association offers a Fellowship with emolument in the range £600—£650, according to qualifications.—Applications should be addressed to Dr. T. P. HOAR, The Department of Metallurgy, Pembroke Street, Cambridge.

NON-FERROUS Foundry in North London requires a WORKING CHARGEHAND. Specialised quality copper alloy castings main output. Good prospects for keen young man willing to work.—Apply, giving general particulars, to Box NF448, FOUNDRY TRADE JOURNAL.

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